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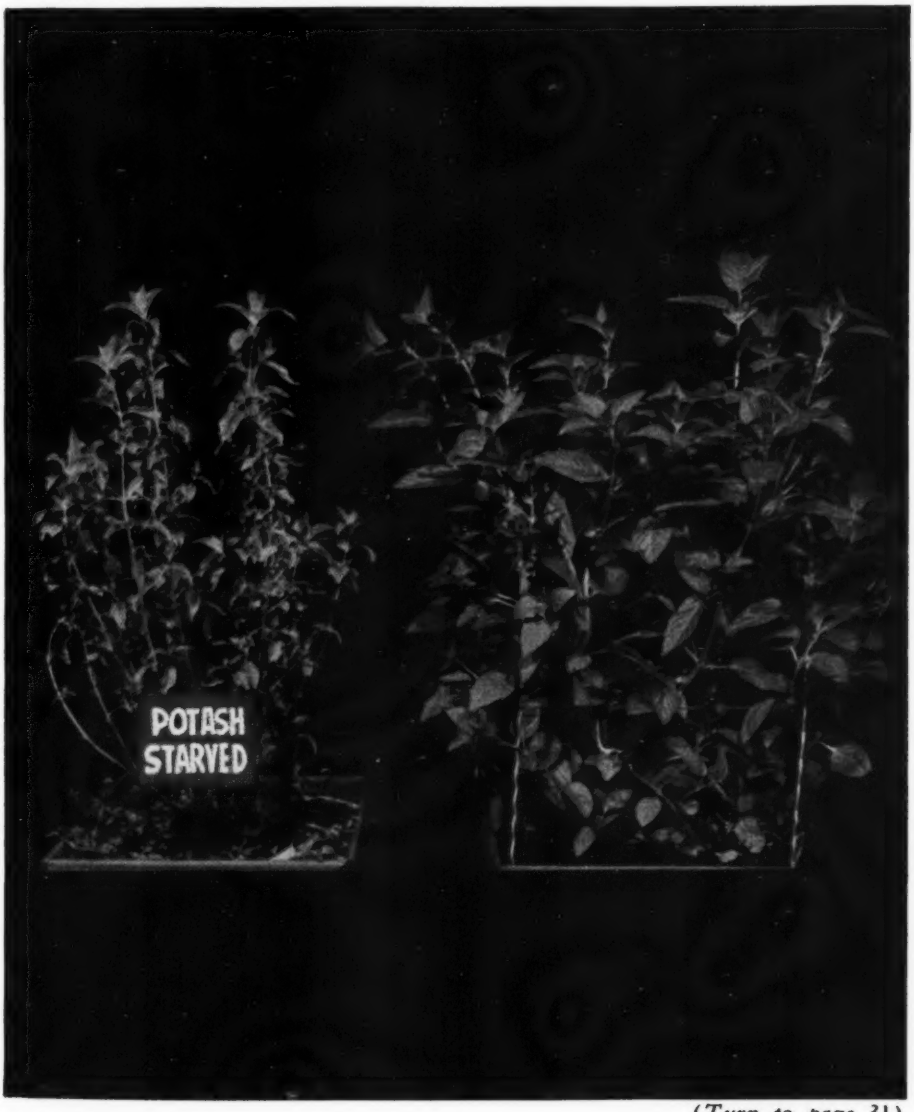

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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: 1102 16th Street, N. W., Washington 6, D. C.

VOLUME XL NO. 4

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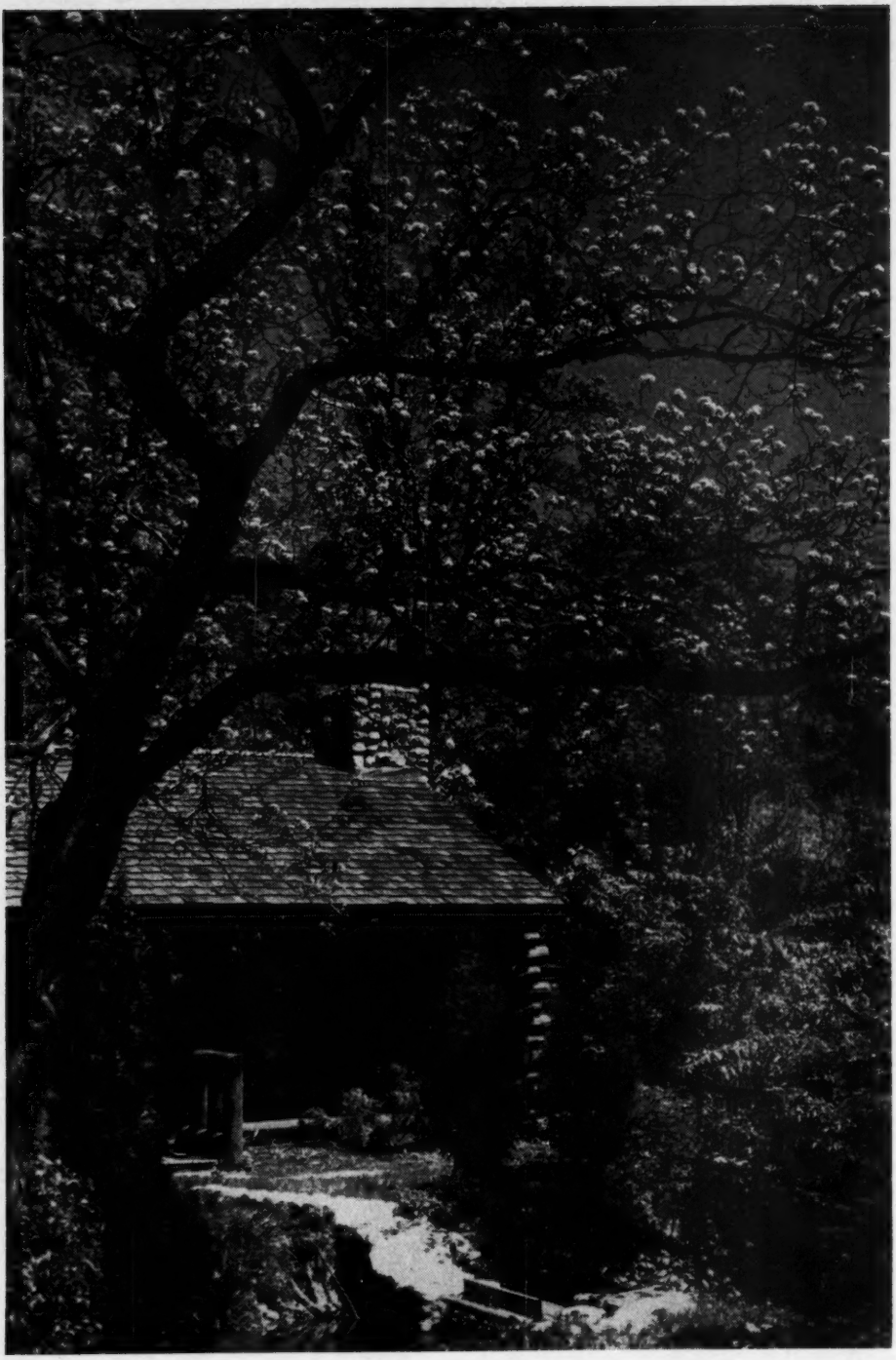

The Shade for This Nook Is Returning

Better Crops with PLANT FOOD

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VOL. XL WASHINGTON, D. C., APRIL 1956 No. 4

Let's avoid arousing . . .

Uncle Sam's Ire

Jeff McDermid

(ELWOOD R. MCINTYRE)

TO most of us honest but confused citizens, the chief way one envisions getting in dutch with Uncle Sam is to forget to make an income tax return by the fifteenth of this month. If it is duly filed, we may have qualms about certain liberties we took with the regulations that may cause us to be fined or otherwise punished for neglect or apparent evasion. Once the federal income tax is accepted and adjustments made, most of us have no more worries in connection with frauds or malfeasance, misdemeanors or felonies.

Yet the great body of laws and regulations now existent wherein Uncle Sam bears down hard on big and little offenders makes delightful reading for us who have neither the brains nor the crust to be liable for severe comeuppance when caught juggling with our future security by violation of statutes. The laws thus "made and provided" for exigencies of manifold kinds would make a big book, illuminated with red lights that tell us to "stop" ere we run headlong into collision with the law on some get-rich-quick speedway.

Almost every government department had prepared comprehensive digests of ways one can get snarled up and taken in the toils through neglect to know the facts of life as a federal employee or one outside the government who can't resist some slick maneuvers when dealing with Uncle Sam and his hired men.

Three years ago, a new summary was made of existing laws that provided for prosecution of persons in connection with activities in the U. S. Department of Agriculture. It has two sections—one about the laws which apply to employees and officers and the other covering statutes that apply to

persons outside government employment, exclusive of civil penalty provisions.

This summary set forth, with proper statute references, the main ways one can get tangled up with legal action while on the federal payroll, as well as subject matter of interest to others who may tread close to the brink of danger, even if they never got a federal check. Obviously, the space in this quiet and law-abiding magazine should not be cluttered up with any large part of these notations. It is enough to say that the chapter headings in this "Newgate calendar" take in bribery and theft, making false claims and statements, violation or abuse of contract, extortion and embezzlement, market speculation, tinkering with appropriations, and engaging in political activities.

THE primrose path for folks outside the government begins with fighting, assaulting or obstructing Uncle Sam's boys while they are performing their regular beholden duties, and takes in the same old bribes and frauds and objectionable conduct which can easily earn a tough guy a stretch of free board in one of the big but plain hotels run without profit by the Department of Justice.

There is an awful mass of material in one of these felony folders that the USDA attorneys have compiled. Almost every notable law ever enacted for the development, protection, and relief of agriculture has these booby traps to restrain impetuous imposters. But we must begin somewhere. So let's confine ourselves mostly to items that you and I without felony talents can more clearly appreciate, such as unlawful political maneuvering and disclosure of forbidden information.

Avowed purpose of the laws relating to political activities is to stop employees of the government from becoming prominently identified with any strictly partisan group or any candidate. Persons employed by any federal, state, territorial, or municipal agency where the activity is financed wholly or partly by the U. S. Government by loans or grants may not officially interfere with or effect the nomination of the president, vice-president, senator, or representative or resident commissioner or delegate of a territory. The fine imposed for violation is $1,000 or one year in prison, or both, maximum figure. It exempts from the penalty any action by an officer or employee of any educational or research institution, agency, or system supported by state or territorial finance, while regular religious, philanthropic, or cultural organizations also pay no heed to this section.

TAKING active part in the management of political campaigns by employees of the federal service is strictly prohibited. Where a violation is detected, such guilty person must be removed at once from the payroll—unless the Civil Service Commission should impose a smaller penalty, but never less than 90 days' suspension. Taking part in strikes against the government or aiding and belonging to a group that advocates the overthrow of our constitutional form of government are likewise subject to loss of job, but the "striker" may be re-employed by Uncle Sam in three years' time if his behavior has subsequently improved.

State or local agency employees working under loans and grants from the United States are not allowed to use their authority to coerce or advise any other employee to contribute or lend funds to aid any party or person for political purposes. Any federal employee who solicits or receives contributions for any political purpose whatsoever from a fellow employee may be fined $5,000 and imprisoned for three years, or both. A similar fine is imposed if the "deal" is made in any room or building occupied in the discharge of official duties.

Of course, officers holding elective offices that are not in the state or mu-

nicipal classified civil service are exempt. In the case of a state, this exempts the governor, lieutenant-governor, and all elected executives. In the sections prohibiting political interference or activities, the ones exempted are, naturally, the president and vice-president, their aids who are paid out of funds to run these offices, heads and assistant heads of executive departments, and all officers named by the president who determine U. S. policies in national laws or in dealings with foreign powers.

Soliciting campaign contributions or subscriptions from any other employee or officer is prohibited in the case of U. S. senators and congressmen, territorial delegate or commissioner, or any officer or employee of the government or anybody getting a salary from the treasury for services to the government. To threaten to degrade or promise to promote any subordinate employee in connection with making or refusing to make contributions or assessments for political purposes is also subject to $5,000 fine or a jail term of not over three years, or both.

IT is double-acting too. Any employee who gives or hands over to any other employee or any member of congress or territorial commissioner or delegate any money or valuables for the promotion of any political objective may be fined $5,000 or be sent to prison, maybe both.

Although they may not solicit or accept political campaign donations and contributions so necessary in a year like this, the body of laws in this category leaves the Secretary of Agriculture and his assistant secretaries and prime policy-makers pretty free to engage in campaign strategy and planning—mighty important in a year when farm bills are the punching-bags. About the same reservations and privileges hold in general for the officers of the Department who are appointed directly by the president. The appointive officers in this case, whose right stems direct from the president, include the governor of the Farm Credit Administration, the administrator of Rural Electrification Administration, and of the Farmers' Home Administration.

This could have the effect of exempting quite a group of regular and special employees of those who take their orders and spend most of their time at the will of the "boss." However, as before noted, there are limits to their activities when it comes to collection or receipt of political party dues and contributions from fellow employees.

NEXT, take the laws against revealing certain types of information. We begin with the w. k. crop-reporting board. Here the law says that anyone employed where he secures select information that could influence current market prices of products of the soil may not impart any such restricted material in advance of the fixed release point. Neither may he engage in speculation through use of his private stock of advance knowledge. Anyone convicted of these violations gets a chance to pay $10,000 fine and/or a ten-year stretch in a striped suit. If a hapless stranger wanders into the crop-reporting rooms on a crop-reporting day, he must stay there until the grand march is made to the waiting newsmen.

Cotton crops get special treatment

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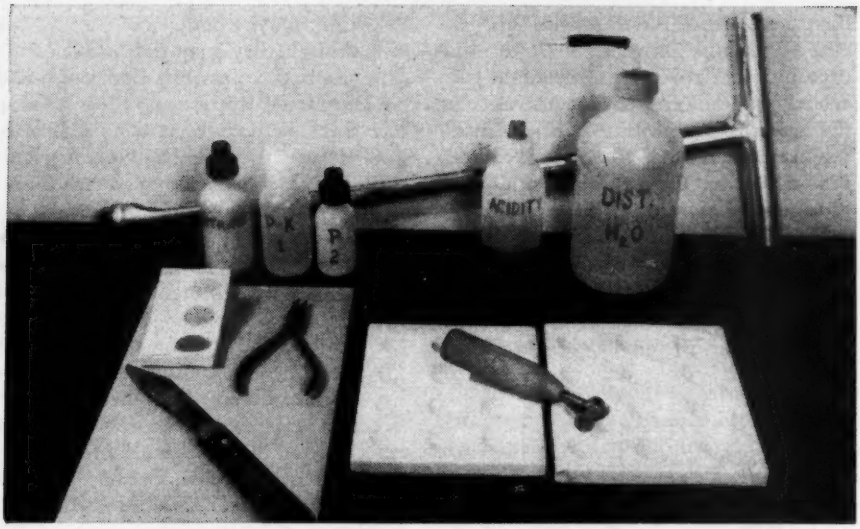

Fig. 1. The equipment shown above is all that is needed for quick soil and tissue testing in the field. Because of its compactness, it is easy and convenient to carry and use.

Surveying Corn Fields by Tissue Tests

By John Falloon

Department of Soils, University of Missouri, Columbia, Missouri

THE rapidity of plant tissue and quick soil tests makes them desirable as a means of surveying the nutritional status of a large number of farmers' fields in a relatively short time. Such a survey can serve to check on the effectiveness of fertilizer recommendations and answer the questions: (1) Are farmers following the fertilizer recommendations? (2) If so, are the amounts of fertilizer recommended adequate? and, (3) If a grower uses only a partial program, is he having nutritional trouble sometime during the season?

One hundred and twenty-five cornfields in Montgomery County, Missouri, were surveyed in a period of 3½ days by three teams of 2 men each in August of 1955. Of the 125 fields, soil test information and past history were available for approximately 90%. The data sheet that was used for each field may be found in Figure 2. In tissue testing the collection of complete information on each field is most essential because all the factors that might possibly influence plant growth must be considered in the interpretation of results.

Corn plant tissues were tested for N, P, and K. Profile samples of the soil at each location were taken with a soil tube. Samplings at 2-inch intervals down the depth of the soil sample were taken and phosphorus and pH determinations made on a spot plate. The soil tests were used to locate the phosphorus and lime in the soil profile.

GROWER: John Jones
LOCATION: Route 3, Buell
COUNTY: Montgomery

CROP: Lespedeza 1954 & Red Top 1955 Corn
DATE: 8–3–55
TIME: 5:00 P. M.

		N	P	K	pH	Notes
Soil test 1–19–55		2.3%	16 lb. (P_2O_5)	140 lb.	6.3	BEC—11.0 m.e., Rolling Prairie
Recommendation		80 lb.	160 lb. (P_2O_5)	50 lb. (K_2O)	LIME 0	
Fertilizer 1954		0	0	0	0	6 T Lime—1947
Fertilizer 1955		6	1,000 Rock 18 P_2O_5	6	0	
Tissue test (Locations in field)	1	L	M	L		Corn—roasting ear stage
	2	VL	M−	L		
	3	L	M	L		
	4	M	M	VL		
	5	VL	M−	M		
	6	L	M	L		
Quick soil test (Locations in field)	1	L L L L M	1	6.0 7.0 5.8 5.8		Soil Moisture-medium
	2	H M L L L	2	6.0 ... 6.5 ...		
	3	L M L L L	3	5.8 6.0 6.0 ...		−Less than pH 5.8
	4	H L L L VL	4	6.0 6.8 6.0 ...		
	5	M M L L L	5	5.8 6.5 6.5 ...		
	6	L L M L L	6	6.0 6.2		
		2 4 6 8 10 inches		2 4 6 8 inches		

Fig. 2. Sample recording sheet for quick tissue and soil tests.

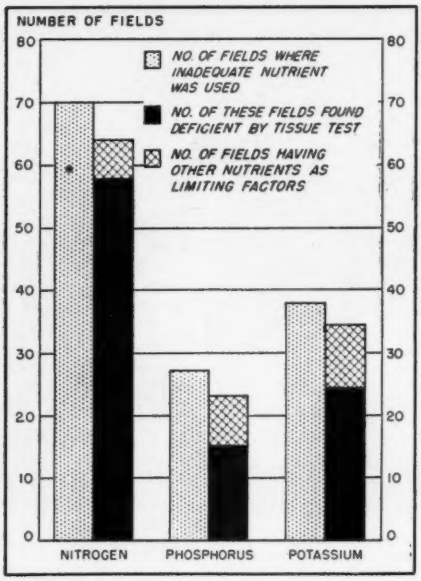

Fig. 3. Comparison of numbers of fields using inadequate nitrogen, phosphorus, or potassium according to soil test, and numbers of these fields showing need by tissue test.

They were very useful in detecting poor distribution of lime and fertilizer in the soil. They also brought to light instances of too shallow plowing. The results will not be reported in this article, however.

Details of the methods used and the sampling technique also will not be reported except to say that Bray nitrate powder was used for the nitrogen test, ammonium molybdate and stannous oxalate for the phosphorus tests, potassium test papers for the potassium test, and Brom Thymol Blue for the acidity test. All materials needed for each team fit compactly into a small fishing tackle box—a fact that makes tissue testing easy for the field worker. Once the sample is taken from the field, less than 2 minutes are required to complete the combined N, P, and K test. Each soil sample can be tested for phosphorus and pH in less than 5 minutes.

Effects of Limiting Factors

Many factors influence plant growth. Plant nutrients are usually among these factors. Before we try to interpret the information given by tissue tests, we must acknowledge the effect of a deficient nutrient as a limiting factor in the growth of the plant. With one nutrient deficient, the total requirements of each of the other nutrients necessary to main-

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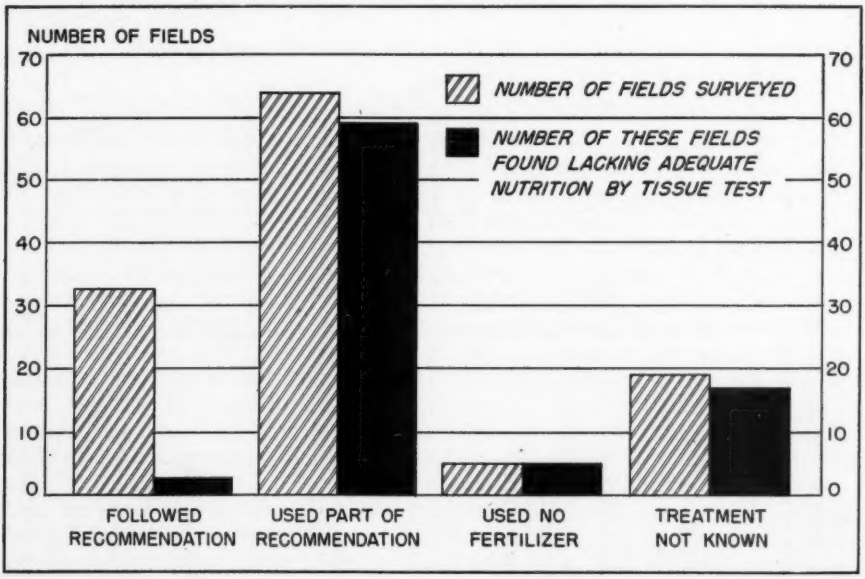


Fig. 4. Number of fields found deficient in nutrients by tissue test as related to treatment.

The Value of Green Manure Crops in Farm Practice

By Frank App, Vernon Ichisaka, and Tejpal S. Gill

Seabrook Farming Corporation, Bridgeton, New Jersey

(*Continued from March Issue*)

Amount of Nutrient in Selected Cover Crops and Influence of Fertility Levels on Total Nutrients

The quantity of plant food we obtain from a well-grown cover or green manure crop is equivalent to a ton of fertilizer, much larger than heretofore appreciated. This amount is greatly influenced by the type of cover crop itself as well as the manner in which it is grown. The details of farm practice for growing cover crops would be similar to that of growing cash crops. Standards of fertility must be established for each cover crop and fertilizers applied in keeping with good farm practice. The amount and analysis of the fertilizer will depend upon the particular cover crop grown and the soil analysis.

The amount of plant nutrients in the cover crop is usually much greater than that applied in the fertilizer. (Tables VII, VIII.)

A summary of the results in 1954 showed an increase in organic matter with each increase in nitrogen for the grasses. It also showed crimson clover to be about equal to 60 lbs. of nitrogen when added to the grasses as a companion crop. In 1955, the yields in Field C-89 were less because of the earlier plowing under of the cover crop. However, the plots showed a marked increase from the previous year's treatment both in amount of organic matter as well as the quality. In Field P-3A, in 1955, the yields of organic matter and plant food were higher. The samples were taken April 24 whereas in Field C-89 samples were taken April 5. The difference in time was largely responsible for the difference in the increased organic matter and plant nutrients. Wheat, rye, and barley responded similarly to nitrogen treatment as well as their growth with crimson clover. Ryegrass had a much smaller percentage of root under the higher fertility levels. In addition, it did not respond to the high fertility levels as much as the other grasses, and it required a little longer period in the spring of the year to develop. (Tables XIV, XV.)

Conservation of Nutrient Residues Left from Preceding Cover Crop and Assimilated by the Cover Crop

The influence of the residues from the preceding cover and corn crop showed a marked effect on the second year cover crop examined from Field C-89 and analyzed March 9, 1955. This shows the increase in N, P, and K in the plant-nutrient composition due to the preceding year's treatment. Furthermore, it indicates the procedure that should be followed for increasing and maintaining the desired fertility levels and the proper fertilizer practice.

The chemical analysis of the cover crops, sampled on April 5, four weeks after the nitrogen treatments, showed further increase in the per cent N, P, and K, of dry weight due to accumulative and current effects.

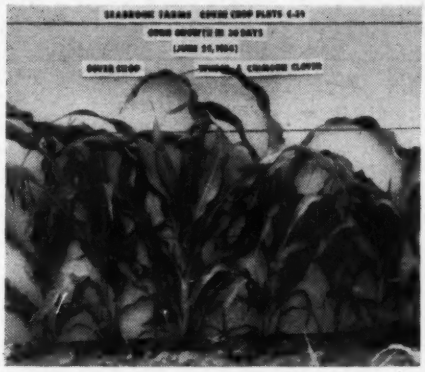
TABLE VII.—RELATION OF THE AMOUNT OF NITROGEN APPLIED TO DIFFERENT COVER CROPS AND THE TOTAL NUTRIENTS IN COVER CROP PRIOR TO PLOWING DOWN FOR THE CASH CROP. (FIELD C-89) 1954-1955

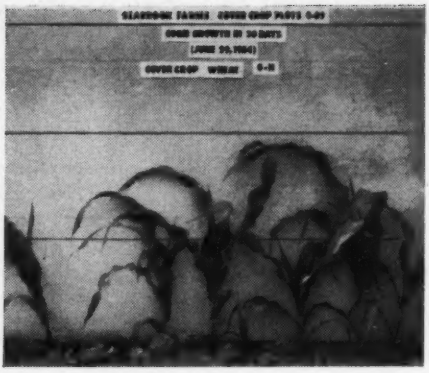
Treatments	1954 (April 26)					1955 (April 5)				
	Rye-grass	Rye	Wheat	Bar-ley	Av.	Rye-grass	Rye	Wheat	Bar-ley	Av.
	Nitrogen lbs./A									
No nitrogen.....	23	36	58	51	42	35	45	54	48	45
60 lbs. N.....	78	79	104	109	93	120	120	127	124	123
120 lbs. N.....	111	96	251	238	174	208	192	151	158	177
Mixture— with c. clover..	126	104	121	136	122	110	102	93	82	97
	Phosphate lbs./A									
No nitrogen.....	23	32	60	46	40	32	34	34	32	33
60 lbs. N.....	68	74	79	45	67	62	53	58	40	53
120 lbs. N.....	78	63	158	72	93	70	64	62	48	61
Mixture— with c. clover..	63	65	62	66	64	58	57	54	49	55
	Potash lbs./A									
No nitrogen.....	148	125	247	289	202	97	77	103	133	103
60 lbs. N.....	362	306	337	350	339	227	152	196	210	196
120 lbs. N.....	398	302	684	569	488	272	258	226	261	254
Mixture— with c. clover..	345	317	328	417	352	238	185	221	233	219

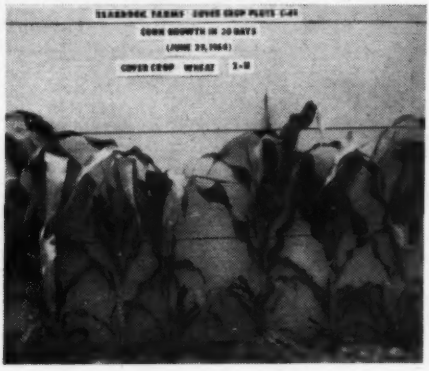
	1953–1954	*1954–1955*
Cover crop planted:	Sept. 10, 1953	Sept. 7, 1954
Nitrogen applied:	March 23, 1954	March 10, 1955
Cover crop sampled:	April 26, 1954	April 5, 1955

A large area of soils along the Atlantic Coast, including the Southern States, is subject to leaching through the winter unless protected by cover crops. Since grasses require a lower fertility level than most cash crops they are an excellent medium for soil conservation. In most cases, however, they will need nitrogen. When legumes are used they require a high fertility level of phosphorus, potash, lime, and magnesium. A combination of the two is frequently desirable. (Tables V, X.)

The nitrogen recovery of the 60-lb. application in all cases was greater than the amount applied. For the 120-lb. application, the recovery was greater for wheat and barley but less for ryegrass and rye. In 1955 the recovery was greater in all cases. Along with the nitrogen there was a very great increase in the amount of phosphorus and potash found in the cover crop. This was true for both years. Consequently, the cover crop served as a producer of organic plant food, a large portion of which was made available for the following cash crop. The time and rate of availability of this plant food are extremely important. They are influenced by the quality when plowed under as well as by the temperature and rainfall following. If one







half of the plant food is available for the first year's cash crop, it represents, in terms of plant food, a ton of average grade fertilizer. The proportion of phosphorus is low. However, in all likelihood, its availability is greater when embodied in the form of organic matter than when applied to the soil as superphosphate. (Tables VII, VIII.) (The fertility level of P and K was ample for grasses without additional application.)

Availability of Plant Food in Cover Crops

The availability of the plant food of cover and green manure crops for the following cash crop depends, to a large degree, on the quality of the crop or degree of maturity when plowed under. Frequently, this is expressed in terms of carbon-nitrogen ratio or the percentage of nitrogen in the dry matter. Most authorities consider 1.5% to 1.7% as the required minimum percentage of nitrogen for a quality crop. They consider the crop has sufficient N, P, and K for decomposition without drawing from the soil and in this manner competing with the cash crop for plant food. Our results in 1954 showed the only cover crop plots that did not take nitrogen from soil were those receiving 120 lbs. of nitrogen or the grasses planted with crimson clover as a companion. From these results the minimum of nitrogen for a quality cover crop should be 2%. (Tables XI, XII.)

Time for Applying Fertilizers

The soil analysis shows available plant nutrients for the cover crop. Fertilizer should be applied when the fertility level shows availability of any one element below the standard required for the particular crop grown. The grasses are very similar in their require-

TABLE VIII.—TOTAL NUTRIENT COMPOSITION IN THE COVER CROPS WITH VARIOUS TREATMENTS. (P-3A) 4/24/55

Treatments	Rye-grass	Rye	Wheat	Barley	Or-chard-grass	Brome-grass	Average
Nitrogen lbs./A							
No nitrogen	91	61	111	72	50	62	74
60 lbs. " (Fall)	116	153	131	133	76	80	114
" " " (Spring)	124	151	158	178	139	145	149
120 " " (Fall)	163	161	171	152	129	134	152
" " " (Spring)	178	143	218	236	187	203	194
Mixture with c. clover	79	110	125	100	81	70	94
Phosphate lbs./A							
No nitrogen	57	54	68	53	33	29	49
60 lbs. " (Fall)	63	119	73	78	50	37	70
" " " (Spring)	74	98	84	80	64	67	78
120 " " (Fall)	45	132	92	76	69	46	77
" " " (Spring)	75	90	101	88	78	79	85
Mixture with c. clover	47	87	71	62	37	31	56
Potash lbs./A							
No nitrogen	274	181	315	346	181	146	240
60 lbs. " (Fall)	345	485	399	393	279	178	347
" " " (Spring)	446	342	488	490	308	326	400
120 " " (Fall)	566	453	443	429	435	272	433
" " " (Spring)	400	456	411	427	444	390	421
Mixture with c. clover	184	373	326	426	160	128	266

ments. Legumes are quite different. It may be desirable to apply fertilizer at the time of seeding of the cover crop if the available plant food is deficient. It may be desirable to delay additional application until either early in the fall after the cover crop is well established or until early in the spring as soon as the cover crop begins to make its growth. In 1955, the spring application proved more profitable than the fall application. This was due to the high fertility level when the cover was seeded. There was sufficient plant food available to carry the cover crop satisfactorily until the following spring. In all likelihood, there was more leaching in the fall application because the cover crop was unable to assimilate the large residues from the preceding corn crop together with that applied in the fall. By the following spring, the residues were assimilated and the cover crop was ready for additional fertilizer. Consequently, the manner of application must be governed by the specific crop to be grown along with requirements of the soil in terms of available nutrients and soil tilth. (Table IX.)

Proper Maturity of Cover and Green Manure Crops Before Plowing Under

The optimum time for plowing under the cover or green manure crop is just before it starts to head. At this time, when properly grown, it will have the desired quality, as well as a large amount of organic matter. Too early plowing will sacrifice a large amount of the organic matter and plant nutrients. The quality decreases throughout

TABLE IX.—INFLUENCE OF DIFFERENT NITROGEN TREATMENTS ON COVER CROP ON THE AVERAGE YIELD IN DRY MATTER AND THE NUTRIENT COMPOSITION OF THE COVER CROPS. (FIELD P-3A) 1955

Cover crop* sampled: 4/24 Treatment	Total dry wt. lbs./A	Nutrient composition					
		Plant analysis % total (tops)			Total nutrients lbs./A		
		N	P	K	N	P_2O_5	K_2O
No nitrogen	7,990	1.20	.31	3.33	74	49	240
60 lbs. N.							
Fall	10,130	1.43	.35	3.78	114	70	347
Spring	10,390	1.77	.38	4.13	149	78	400
120 lbs. N.							
Fall	10,520	1.76	.38	4.33	152	77	433
Spring	10,770	2.23	.40	4.17	194	85	421
Mixture grass	8,520	1.18	.34	4.03	94	56	266
Mixture clover		2.39	.36	3.26			

Planted: Sept. 3, 1954 Nitrogen applied: Fall Oct. 12, 1954
Spring March 11, 1955

*Average of ryegrass, rye, wheat, barley, orchardgrass, and bromegrass.

the entire growing period until the mature stage is reached. Farm practice necessary for the cash crop frequently decides the time of plowing.

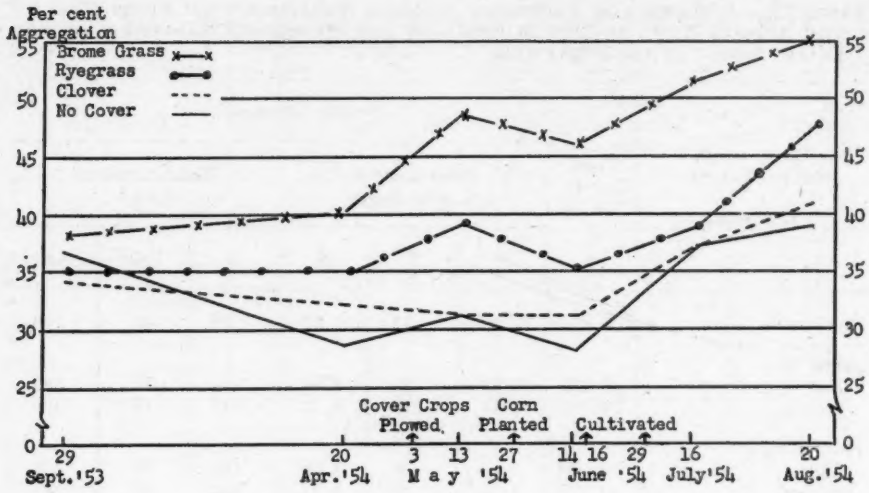
The cover crops grown in experimental field P-3A, sassafras loam, were sampled periodically to study the chemical composition and changes of quality. This decreased with maturity. (Table XIII.)

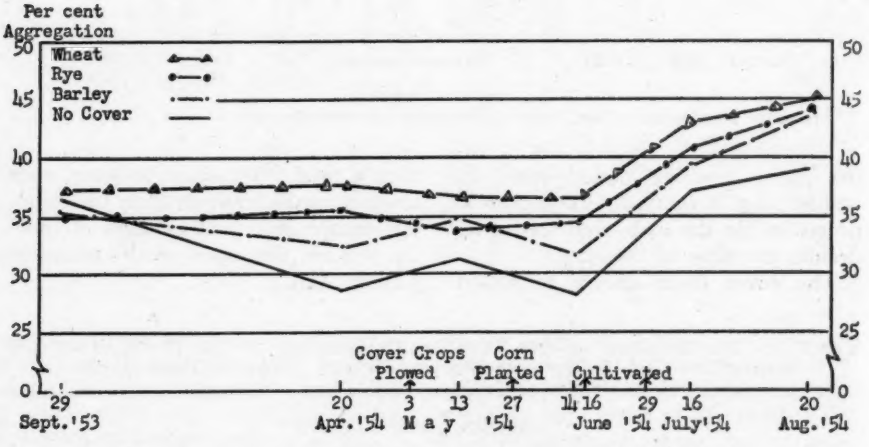
TABLE X.—RELATIONSHIP OF THE NUTRIENT COMPOSITION OF THE COVER CROPS AND THE PLANT-FOOD RESIDUE OF PREVIOUS CASH CROPS. (FIELD C-89)

Cover crop treatments 1954	Soil nitrogen levels lbs./A*			Per cent nutrient content of cover crops prior to 1955 treatments March 9, 1955		
	After corn	With cover crops				
	8/20	10/7	3/9	N	P	K
No nitrogen	25	5	3	1.37	.29	1.42
60 lbs. N.	30	5	3	1.45	.30	1.55
120 lbs. N.	51	5	4	1.75	.30	1.96
With c. clover	47	8	4	1.76	.34	2.08

Cover crop planted: Sept. 7, 1954

* Average of ryegrass, rye, wheat, barley, and orchardgrass in three replications.





Cover crops planted: September 10, 1953
Corn harvested: August 20, 1954

Relationship of Fertility Level to the Proportion of Top and Root

Fertility levels too high in nitrogen tend to reduce the proportion of root growth. This not only is important in the production of cover and green manure crops, but it also is important in growing crops such as corn. Our fertilizer-use standards should provide for the objectives essential for each particular crop grown. Fertilizer practice and placement should give consideration as to how plants grow. Fertilizers and cover or green manure crops should be used as an aid to growth, as well as to maintain proper fertility levels and provide the requirements of soil conservation and tilth. (Tables XIV, XV.)

Relation of the Selection of the Cover Crop to Tilth Measured in Terms as Water-stable Aggregates

Good crop production depends on good tilth (soil structure) as well as optimum fertility levels. The selection

TABLE XI.—THE RELATIONSHIP OF QUALITY OF THE COVER CROP TO THE SOIL NITROGEN LEVEL OF THE FOLLOWING CORN CROP. (FIELD C-89) 1954

Treatment	Cover crops			Soil nitrogen level (lbs./A)						
	Total dry wt. lbs./A	% N t & r Av.	Total N lbs./A	6/14	6/28	7/9	7/16	7/26	8/12	8/20
Ryegrass										
No nitrogen	4,450	.52	23	60	22	18	45	39	30	24
60 lbs. N	9,250	.84	78	38	22	33	42	39	37	36
120 lbs. N	7,600	1.46	111	50	59	80	80	68	81	45
and c. clover	7,600	1.66	126	91	59	35	102	85	61	52
Rye										
No nitrogen	5,700	.63	36	30	23	22	75	55	34	24
60 lbs. N	9,500	.83	79	49	18	40	71	41	50	26
120 lbs. N	7,050	1.36	96	65	36	61	62	69	64	44
and c. clover	7,600	1.36	104	68	49	49	96	84	52	48
Wheat										
No nitrogen	7,000	.83	58	31	26	26	71	43	29	20
60 lbs. N	8,100	1.28	104	36	23	16	72	42	45	22
120 lbs. N	12,600	1.99	251	68	76	75	104	84	101	60
and c. clover	6,850	1.77	121	51	47	41	68	71	46	44
Barley										
No nitrogen	5,850	.87	51	31	22	24	48	51	47	23
60 lbs. N	5,900	1.85	109	.....	.....	.....	.....	.....	.....	.....
120 lbs. N	9,050	2.63	238	76	49	41	85	79	98	47
and c. clover	8,350	1.63	136	66	59	49	83	56	53	42
Crimson clover	4,200	2.78	117	83	72	51	117	112	75	64

of the cover or green manure crop will greatly influence the improvement in tilth. Grasses with elaborate root systems, such as ryegrass, orchardgrass, or brome, predominate in establishing and maintaining the desired tilth. Of these three, we have found ryegrass the most practical to use. Rye, barley, and wheat appear to be about equal. There was a tendency for better tilth through the

TABLE XI A.—(AVERAGES)—THE RELATIONSHIP OF QUALITY OF THE COVER CROP TO THE SOIL NITROGEN LEVEL OF THE FOLLOWING CORN CROP. (FIELD C-89) 1954

Treatment	Total dry wt. lbs./A	% N t & r Av.	Total N lbs./A	Soil nitrogen level (lbs./A)*						
				6/14	6/28	7/9	7/16	7/26	8/12	8/20
No nitrogen	5,750	.73	42	38	23	22	60	47	35	23
60 lbs. N	8,188	1.14	93	41	21	30	62	41	44	28
120 lbs. N	9,075	1.92	174	65	55	64	83	75	86	49
With c. clover	7,600	1.61	122	69	54	43	87	74	53	47
C. clover alone	4,200	2.78	117	83	72	51	117	112	75	64

* Soluble nitrogen—average of ryegrass, rye, wheat, and barley plots.

growing season in the corn crop where no fertilizer was applied to the ryegrass. However, this is not a good practice. We must compromise between tilth and quality of the cover crop. We have not yet established the required standards for tilth for the various crops grown. Tilth required for a seeding of grass would be quite different from that of corn.

Effect of Various Cover Crops on Soil Structure (Water-stable Soil Aggregates)

There was a considerable difference between the cover crop species as to their effect on soil structure. Sod-type grasses, like ryegrass and bromegrass, were much better than grain crops and clover. (Table XVI.)

The initial soil aggregation, September 29, 1953, was approximately the same for all the plots. The check plot without cover crop had a reduction in stable soil aggregates from winter exposure. The plowing of the soil for the corn crop increased the porosity but did not increase the water-stable aggregates. Tillage in preparation of the seedbed and for corn reduced the aggregates. The stable aggregates increased beginning June 24 to August 20 for all plots, presumably because of rainfall. The greatest increase was from the ryegrass and bromegrass plots. The moderate amount of nitrogen applied to ryegrass gave better root growth and in turn slightly better tilth measured by soil porosity. The check plot was allowed to go to weeds. However, the weeds did not affect the porosity of the soil during 1954. In most cases the selection of the cover crop itself had more influence on soil aggregation than the fertility levels used in this research project. There is a very definite correlation between the cover crops selected and the soil aggregation.

Soil Conservation

Since all agriculture is dependent on soils, it is essential that we appreciate the necessity of not only maintaining but also increasing our soil productivity. Our nation's greatest wealth is based upon our soils. We have considered crop rotation a major factor in soil conservation as well as soil productivity. This rotation usually included a hay crop which left the sod as a residue. Cover and green manure crops, on the other hand, not only provide the elements of the sod but also a large amount of organic matter containing an exceptional amount of plant nutrients for the following cash crop. It would appear that much of our agriculture would be greatly benefited by substituting unprofitable rotations with cover and green manure crops wherever they can be properly fitted into the farm practice. This is a matter of appraisal value and results from the particular system of farm practice followed. Rotations have not maintained the fertility or the tilth of our soils. This was not always the fault of the rotation but rather the way that the crops were grown and fertilized. Diseases and insects may require a crop rotation. Nevertheless, the grower should always consider the desirability of adding a cover crop and in that manner enhance the farm practice for soil conservation as well as fertility. The value of organic matter in the soil is well known. Still, we have not developed our farming practice so as to provide organic matter by the most desired methods as well as results.

Influence of Cover Crop on Yield of the Following Cash Crop

The 1954 cover crop plots were planted to sweet corn. The rainfall was quite deficient. The yield of our commercial crop was practically 50% of normal. Because of this, the differences, while substantial, were not as great as normally occur. (See data in tabulation entitled "Effect of Nitrogen Fertilization on Cover Crops upon the Yield of Marketable Husked Ears of Sweet Corn.")

(*Turn to page* 40)

Fig. 1. Holstein-Friesian cattle—a strain which is "indigenous" to the Soviet Union.

Soviet Farm and Family Life

By William E. Reed

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THE most pronounced observation, and perhaps the greatest contrast between Soviet agricultural production and that found in the United States, is that practically all agricultural production in the Soviet Union is organized on the basis of collective and state farms. A small number of Nomadic peoples live in sparsely populated regions of the country, but their contribution to total agricultural production is insignificant. There are absolutely no independently operated family-size farms in the Soviet Union. Therefore, a discussion of agricultural production problems and the attendant farm and family life must concern itself with the collective and state farm systems, which in turn are controlled and regulated by the dictates of the highly centralized Soviet government.

According to the latest reports, the number of collective farms total roughly 89,000. These collectives cover about 83% of the present arable acreage of the country. They average about 15,000 acres in size and draw their labor from farm villages which average some 800 people each.

As indicated in Communist theory, collective farms, or Kolkhozes, are defined as cooperative associations of farmers who pool land and other resources to form a large business enterprise, to be operated in common with each farmer sharing in the net profits in proportion to the quantity and the quality of work performed. The general impression would seem to be that collective farms have some of the dem-

ocratic characteristics to be found in Western European and American cooperative arrangements. However, closer observation and insight into the actual situation would lead to a different conclusion.

Collective farms in the Soviet Union cannot be disguised other than as state enterprises under the complete domination of the central government. Individual action and freedom can function only within this context. Detailed operations regarding what, where, when, and how each crop is to be planted are dictated. A similar situation is seen in livestock enterprises regarding rations to be fed and the number of times per day that each cow is milked. It would appear that all directives issued by the Soviet government are quite arbitrary and inflexible. For example, it is government policy to milk dairy cows four times a day; thus every producing cow in the entire country is milked four times per day regardless of whether she is a high or low producer—this is the regulation and it appears to be followed without question.

The institutions designed by the government to control collective farms are the machine and tractor stations that perform the mechanized operations on the collective farms. The director of the machine and tractor station is responsible for carrying out orders and applying technical advice which he receives as a part of the general dispensation of information through a line of sub-ministries under the Soviet ministry of agriculture.

Each collective farm has a chairman which to some degree is comparable to a farm manager in the United States. His function is to immediately supervise the farm. To assist him there is one agrotechnician (agronomist) in charge of crop production, one zootechnician (animal husbandryman) in charge of animal production, one accountant in charge of bookkeeping, and additional specialists and office help considered necessary.

Collective farms do not and cannot own tractors and other pieces of farm equipment used on collective farms. The state-owned machine and tractor stations perform all mechanized farm operations on a type of custom basis. At the end of the season when the crops are harvested, each collective farm delivers a percentage of the pro-

Fig. 2. Five-cutter-bar mowing machine that cuts a 40-foot strip. This operation appears to be quite clumsy.

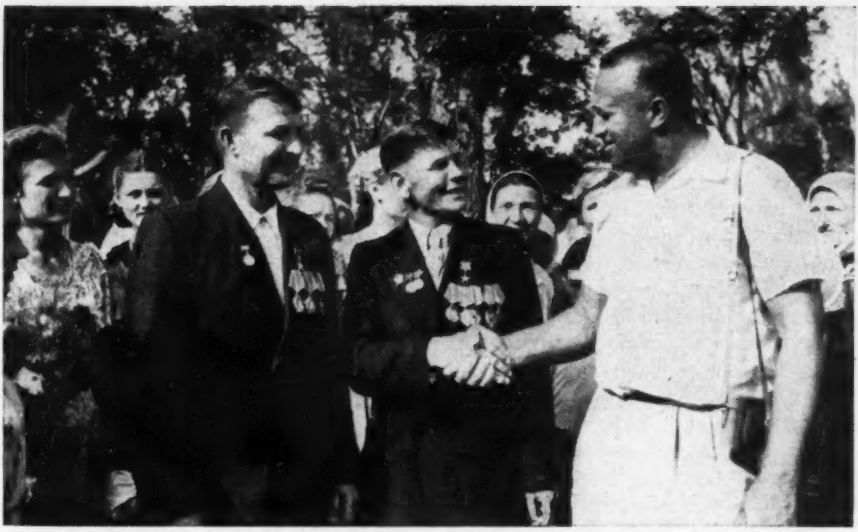

Fig. 3. The author shaking hands with two bemedaled Soviet State farm workers—two heroes of Soviet labor. The medals are the type of "incentive" used to increase production.

duction to the state as payment in kind for services of machine and tractor stations.

The communal or collective organizations of farm life in the Soviet Union, as contrasted with the farm family living on separate farmsteads in the United States, are modifications of the "village commune" or "Mir" that existed as far back as the fourteenth century. It is believed that collectivization would not have been possible if the "Mir" had not hindered the crystallization of a concept of stable individual property rights in land among the Russian peasants.

Quite unlike the independent farmer in the United States who relies pri-

Fig. 4. Collective farm chairman presenting W. V. Lambert, Dean of the Arkansas College of Agriculture, a loaf of bread and saucer of salt—an expression of lasting friendship.

marily on family labor, collective farms rely on labor from farm villages (artels). These farm laborers are organized into brigades ranging in number from 30 to 70 persons, and work under the direct supervision of a brigadier or work foreman. The term "laborers" is used intentionally because under collective farm organization a so-called peasant farmer must function, for the most part, only under the direction of the brigadier. Minute detail is given to each individual farm worker in an attempt to have him meet and surpass his "work norm." The individual worker is independent of his family in his economic relationship with the Kolkhozy. The wife works independently of the husband.

Attempts are made to standardize the size of farm production units so as to accommodate a whole work brigade. However, some farm jobs require that a brigade be subdivided into smaller work units called Zvenos.

Payments to the individual collective farm workers are determined by the number of work-day units each collective farm worker earns during the year. Work-day units are arbitrarily arrived at work loads similar to piecework in factories. Payments are made both in cash and kind. Partial payments may be made to collective farm workers from time to time in the form of an "advance allowance," the amount, of course, depending on the number of work-day units earned up to that time. At the end of the harvest period after all obligations to the state are fulfilled and necessary food reserves are set aside, the surplus produce may be sold on what amounts to a more or less free market, and the remaining produce, and net cash are pooled for general distribution among farm workers according to the number of work-day units earned.

There is a small additional source of income accruing to individual farm households on collective farms. Each farm household may have use of a private plot of land on which to construct a home, grow a garden, and the like. These plots vary in size from one half to a fraction over an acre. They supply a substantial part of the household food requirements, plus some additional income from sale in the free market. In addition to the private plot, each collective farm family may have one cow and two calves up to two years of age, one sow and a litter of pigs, some poultry, and in some regions as many as 10 head of sheep.

That part of the arable land which is not in collective farms is in large state farms. There are 5,000 such units in the country at present, with an average size of 38,000 acres. Thus they are considerably larger than collectives. As far as organization is concerned, the nearest approximation to these farms in the United States would be institutional farms.

Each state farm has a director and several specialized assistants. All workers on these farms are paid fixed salaries and bonuses. If the work performance is satisfactory, they receive full pay regardless of the outcome of the crop.

In a sense state farms are the demonstration farms in the Soviet Union. In general, buildings are in better repair and these farms are said to be more productive than collective farms. However, since most costs are fixed, it is reported that often they are less profitable to the state.

Since collectivism, or communal organization, sets the tone for life in general in the Soviet Union, no exception is found in rural agricultural areas. Rather than the farm and the family being integrated into a production unit as is the case in the United States, the artel and the life processes which surround it become the point of interest. All farm families necessary to run the collective and state farms by Soviet standards live in these compact villages, the usual population of which ranges from a few hundred upward to several thousand. Each farm family, as a rule, lives in a very modest home comprising

Fig. 5. Machine and tractor station, Krasvador. The equipment resembles American models of early thirties.

living space that would be equivalent to a third, and certainly no more than half, of that found in the average American farm home. Household conveniences as we know them are meager. Those on hand differ in styling and usefulness.

These farm villages provide some aspects of a social atmosphere that one would expect to find in small rural hamlets like that of the United States perhaps during the 1920's. However, there are several notable exceptions. Generally the villages do not have churches and stores. What one finds in each village, however, are day nurseries, nursery schools, kindergarten schools, grade schools, a hospital, club, and an occasional theatre. Since each school is tied to the institutional framework of the collective, no facilities for transporting students, like school busses, are to be found; nor are they needed.

Observation in the villages indicates that a definite economic stratification exists, and attached to the economic pyramid is a discernible social stratification which would run something like this: The director or chairman of the farm, professional specialists including party members, teachers, doctors, nurses, skilled technicians, brigadiers, and at the bottom the farm laborers. The monthly gross incomes average about 650 rubles for farm laborers, and up to approximately 4,000 rubles for the farm chairman.[1]

Farm family life in the country appears not to have the binding devotion and warmth, the interdependence of husband and wife, nor the dependence of children which is typical of the American farm family. Family life is submerged into group life. Parents have less influence over the child, and the child is less dependent on parents. At two months of age the child is placed in a day nursery to allow the mother to return to work, and from then on to adulthood, he eats, plays, and studies in groups. Only on the day of rest, usually Sunday, is it possible for the family to have a full day to eat and visit together. All able-bodied workers, including wife and husband, work six days per week.

Problems connected with agricul-

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[1] The official exchange rate of the ruble is 25¢, but in terms of actual purchasing power a ruble is worth no more than 8¢.

The Relation of Potassium to Fruit Size in Oranges

By W. W. Jones and T. W. Embleton

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THE small size of oranges, especially Valencia oranges, has been a problem in southern California for many years. Much work on this problem has been done and it has been found that several factors exert an influence on fruit size. Some of these factors are time of harvest (10), the number of fruit per tree (10), temperature (3), potassium levels in the tree (4, 9), and soil moisture (8).

Potassium

In general, fruit size increases with an increase in the supply of potassium. Chapman et al. (4) found that in solution cultures in which potassium in 4- to 7-month-old leaves ranged from 0.3% to over 2%, fruit size increased as the leaf K increased. In Florida (12) both sand culture and field studies showed an increase in fruit size as leaf K was increased from 0.8% to 2%. In orchard studies in California, Parker and Jones (8) found that the size of Navel oranges increased as leaf K was increased. This relationship is shown in Figure 1 and Table I.

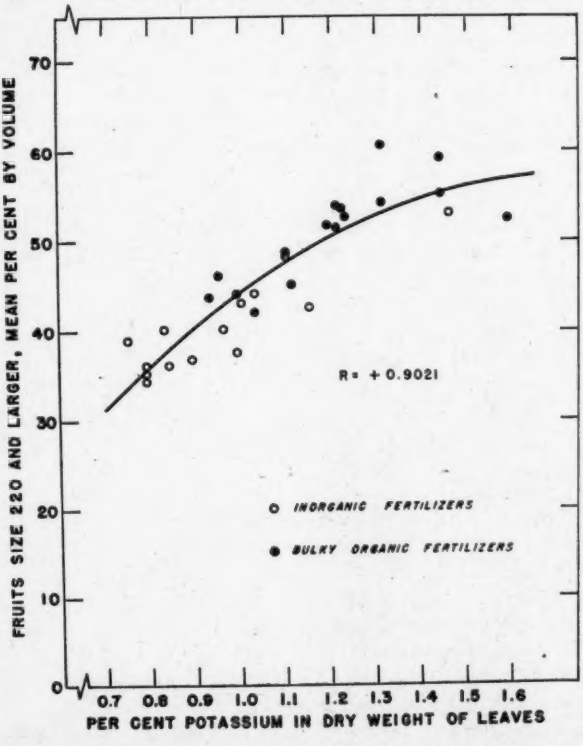

Fig. 1. Relation between the average size of the fruit—expressed as the percentage of fruits size 220 and larger, by volume—of the crops harvested 1946-1949 and the potassium content of the dry matter of leaves sampled in December 1948. The data are for trees which have received various fertilizer programs. Each point in the graph is the mean of 32 trees.

Figure 1 shows that fruit size increased as potassium in the leaves increased from 0.7% to about 1.3%. Very little increase in fruit size occurred when potassium in the leaves increased above 1.3%. Table I shows a slight increase in yield and in size

TABLE I.—AVERAGE EFFECTS OF FERTILIZATION WITH SULFATE OF POTASH ON FRUIT SIZE, EXPRESSED IN VARIOUS WAYS, AND ON OTHER CHARACTERISTICS OF THE CROP. HARVEST OF 1941-1949. EACH FIGURE IS A MEAN OF 160 TREES.

Fertilizer treatment	Fruits size 220 and larger (per cent by volume)	No. of fruits per packing box	Fruit diameter (inches)	No. of fruits per tree	Yield (pounds)	Fancy and choice grades (per cent by volume)	
						Total of all sizes	Size 220 and larger
Potash.....	61.77	225.3	2.604	422.6	163.74	76.54	52.39
No potash....	54.83	236.9	2.559	426.2	158.46	74.56	45.68
Difference.....	6.94	−11.6	0.045	−3.6	5.28	1.98	6.71

with the addition of potash. Since there is a slight decrease in the number of fruit per tree, the increase in yield is related to increase in fruit size. Smith and Reuther (12) report that in no case has potash fertilization reduced the size of fruit. Recently, exceptions have been found and will be reported. There are also exceptions to the positive correlation between fruit size and leaf K. In a survey reported by Jones and Cree (9), 283 Valencia groves were considered. They were in 25 local areas. Of the 25 local areas, 16 had a positive and 9 a negative relation between leaf K and fruit size. When all 283 groves were considered as a unit, the positive relationship between leaf K and fruit size was lost.

Since under controlled conditions of water culture (4) and sand culture (12) there is always a positive relation between K and fruit size, it is of importance to know why this relationship does not always exist under field conditions. Results from field experiments shed some light on the problem.

Potash Fertilization and Fruit Size

In two recent experiments the applications of potash fertilizers have resulted in a decrease in fruit size. In the first trial, potash was applied at the rate of 30 lbs. K_2O per tree. Applications were made in April 1950 and February 1952 for a total of 60 lbs. K_2O per tree. Table II shows the average results for a two-year period (1954 and 1955).

TABLE II.—THE INFLUENCE OF POTASH FERTILIZATION ON YIELD AND FRUIT SIZE OF VALENCIA ORANGES. AVERAGE FOR 1954 AND 1955. MEANS OF 6 REPLICATIONS OF 4-TREE PLOTS.

Treatment	# Fruit/tree	% 252 and larger
Check.....	1,507	50.69
Potash.....	1,416	43.97
Sig.....	N.S.	N.S.

The differences shown in Table II are not statistically significant. The

TABLE III.—COMPOSITION OF VALENCIA ORANGE LEAVES—% D. W. JULY 20, 1954.

Treatment	K	Ca	Mg	P	N
Check.	1.02	3.98	.153	.151	2.62
Potash.	1.26	3.67	.125	.160	2.61
L.S.D.. @ 5%.	.10	N.S.	.013	N.S.	N.S.
L.S.D.. @ 1%.	.....	.....	.018	.....	.....

trees that received potash tended to produce smaller fruit than the check trees over a 2-year period. Leaf composition is shown in Table III.

Potash application has increased the K in the leaves and at the same time has decreased the magnesium.

In the second experiment (6) similar results were obtained. (See Table IV).

TABLE IV.—SIZE OF VALENCIA ORANGES FOR 1954 AND LEAF COMPOSITION FOR SEPTEMBER 1953. MEANS OF 30 TREES.

Treatment	No. of fruit/ tree	No. of fruit/ packed box [1]	Leaves— % D. W.	
			K	Mg
Check..	440	196	.74	.213
Potash.	564	206	1.15	.165
L.S.D. @1%..	83	9	.07	.018

[1] Inversely related to size.

Magnesium in the leaves was reduced in both of these locations by potash applications. This relation between potassium and magnesium is common (12). The reduced size of fruit with potash application is not common (12). The Mg in the leaves reported here is in the deficiency range (5) and with a reduction of Mg by K, the Mg becomes even more deficient. Under these conditions, apparently Mg is the limiting factor (1, 2) and potash applications give the expected results, i.e. reduced fruit size. Most groves in California are not deficient in magnesium. In the survey referred to above (9), only 31 groves out of the total of 283 (11%) had a leaf Mg of 0.200% or less.

Water—Potash—Fruit Size

In several field experiments, the design is such that the replications occur across the irrigation run. Often the fruit size decreases with distance from the pipeline. In one experiment, potash application has resulted in an increase in fruit size. This was shown in an analysis of the data in which the influence of location was removed. But the simple correlation between leaf K and fruit size was negative. The explanation for these opposite effects is shown in Figure 2.

Figure 2 shows that the size of the fruit is reduced as the distance from the pipeline is increased. This is a common observation. Potassium in the leaves increases with distance from the pipeline. In this case, it appears in comparing locations that water is the limiting factor on fruit size. Yet, within a given distance from the pipeline, potash applications increased the concentration of K in the leaves and increased fruit size.

In another experiment, the results shown in Table V, there was a decrease in fruit size with distance from the pipeline but no influence on K in the leaves. Here again water appears to be the limiting factor on fruit size.

TABLE V.—THE RELATION OF FRUIT SIZE OF VALENCIA ORANGES AND LEAF K TO DISTANCE FROM PIPELINE. EACH FIGURE IS A MEAN OF 28 TREES.

Location from pipeline[a]	No. fruit/ packed box	Per cent K in leaves
1	222	.54
2	234	.51
3	248	.51
4	281	.53
Sign.	**	N.S.

[a] No. 1 is next to pipeline. No. 4 is farthest from pipeline.

In one experiment in which the amount of irrigation water absorbed into the soil was determined, a simple correlation coefficient of −.335 was found between water applied and leaf K. This is not significant, but indicates a tendency for increased K with limited water.

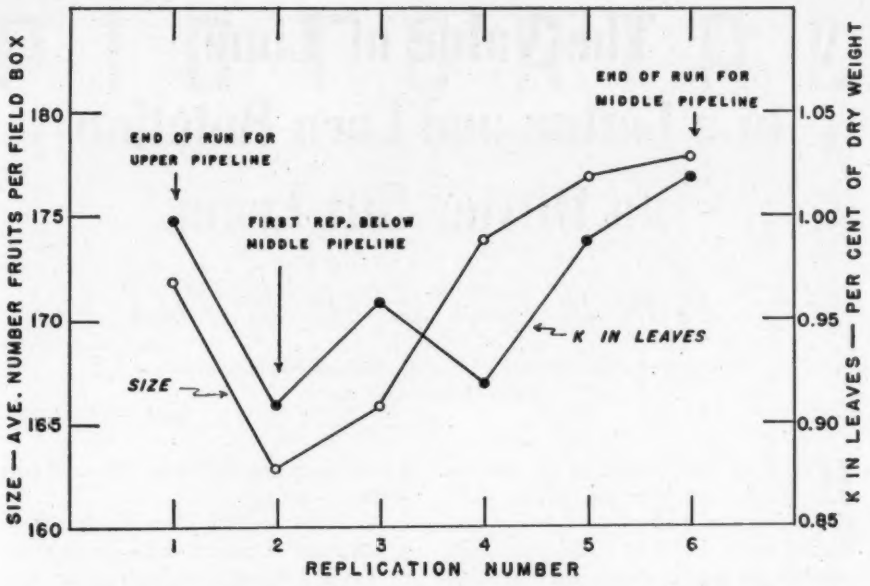

Fig. 2. The influence of location distance from irrigation pipeline on fruit size and percentage potassium in the leaves of Valencia oranges. Each point in the graph is a mean of 12 trees.

Conclusions

1. In most cases, potash applications result in increased fruit size of oranges, but there are exceptions.

2. Potash applications may decrease fruit size when magnesium is in or near the deficiency range.

3. Water may become the limiting factor on fruit size and in such case the relation between fruit size and K may be either positive or negative.

4. For potassium to exert its full influence on orange fruit size, other limiting factors must be removed.

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The Value of Lime in a Cotton and Corn Rotation on Olivier Silt Loam

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HALF of the blocks in an area of Olivier silt loam on which phosphate fixation studies were being conducted were limed in 1946 with 3,000 pounds per acre of dolomitic limestone. Following the phosphate studies and beginning in 1948, cotton and corn in rotation were fertilized annually with three levels of N, P_2O_5, and K_2O as indicated in Table I. The nitrogen was applied as ammonium nitrate, the phosphoric acid as ordinary superphosphate, and the potash as muriate of potash. All corn plots except the checks or unfertilized plots were sidedressed with 48 pounds of nitrogen in addition to the other treatments indicated in Table I which were applied under the seed just before planting.

A summary of the results from seven crops of cotton and corn as given in Table I shows that both cotton and corn were benefited from the use of lime alone and lime with all fertilizer treatments. The highest yield of corn, 69.6 bushels per acre, was obtained from the limed plots which were fertilized with 600 pounds per acre of 8-8-4 and sidedressed with 48 pounds per acre of nitrogen. This yield was 8.0 bushels more than that from the plots receiving the same fertilizer treatment without lime. The highest yield

(*Turn to page* 49)

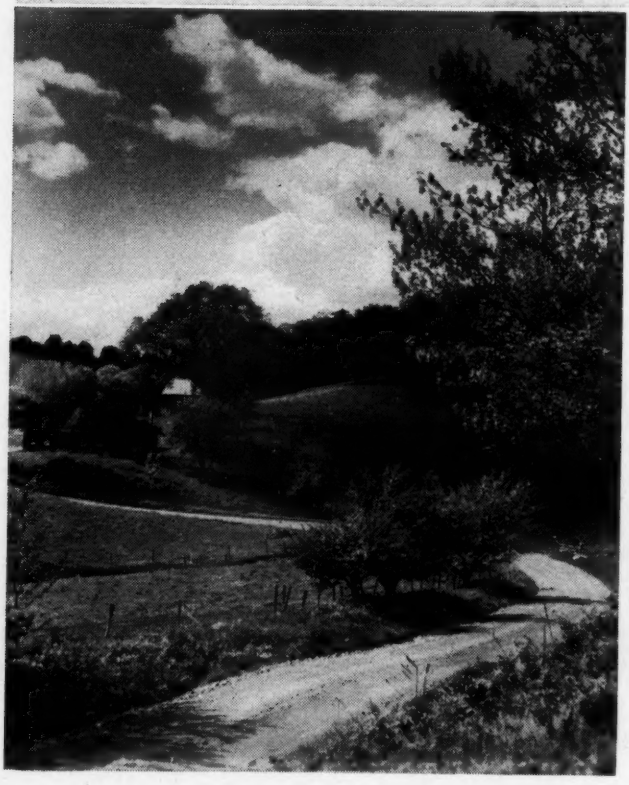
TABLE I.—THE EFFECT OF DOLOMITIC LIMESTONE AND FERTILIZERS ON THE YIELD OF COTTON AND CORN IN A ROTATION ON OLIVIER SILT LOAM, BATON ROUGE, LA., 1948

Fertilizer treatment 600 lbs/A.	Corn in bu/A.		Cotton in lbs. seed cotton/A.	
	Limed [1]	Not limed	Limed [1]	Not limed
0-0-0	34.4	19.2	759	484
8-0-0	54.9	44.5	1,163	1,051
0-8-8 [2]	53.2	50.2	1,456	1,190
4-8-8 [2]	61.7	57.8	1,579	1,342
8-0-8 [2]	56.3	48.4	1,261	1,039
8-4-8 [2]	63.1	55.0	1,655	1,356
8-8-0 [2]	63.3	59.3	1,359	1,347
8-8-4 [2]	69.6	61.6	1,729	1,556
8-8-8 [2]	69.5	62.0	1,832	1,471
L.S.D. (0.05)	6.7	6.7	301	301

[1] Limed in 1946 with 3,000 pounds per acre of dolomitic limestone.
[2] Corn plots sidedressed with an additional 48 pounds N as NH_4NO_3.

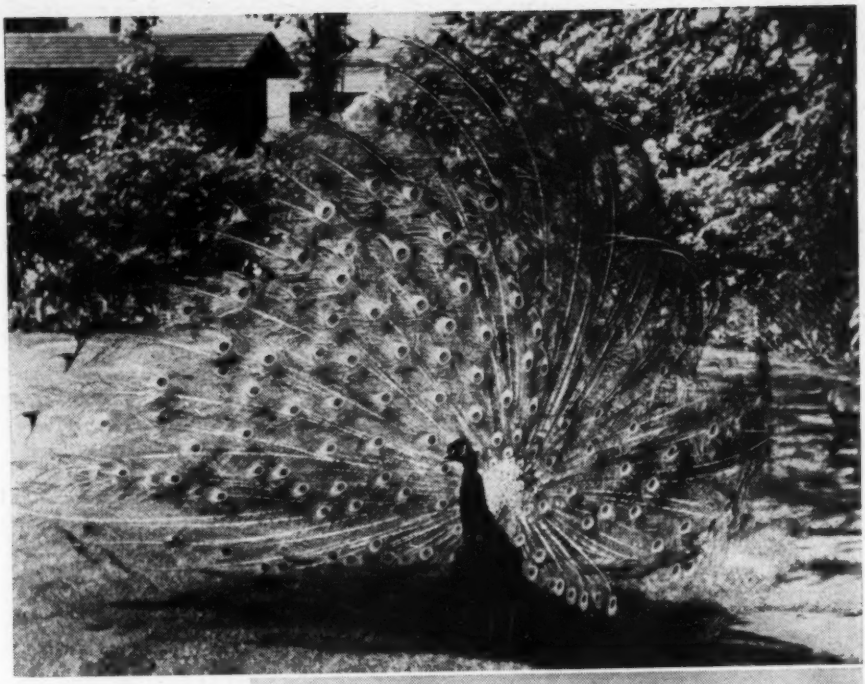
PICTORIAL

Youthful Explorers on the Mississippi River

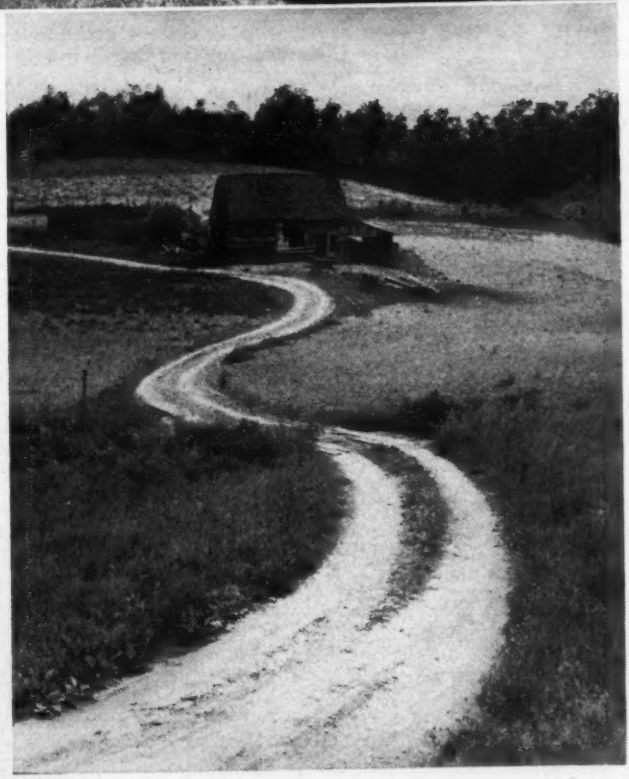


Above: A Mallard duck and family.

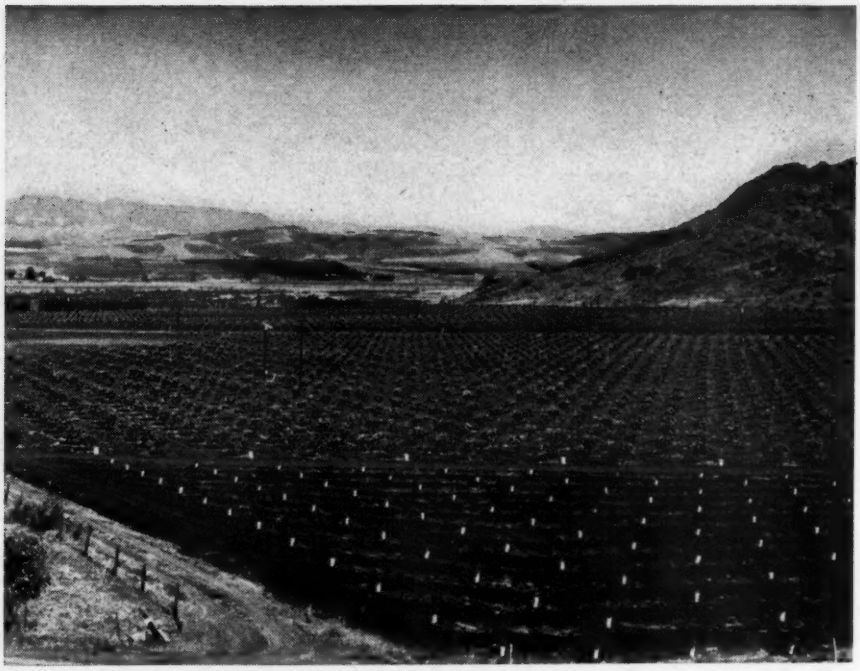
Left: A winding road that attracts.



Above: Ready to strut his stuff.



Right: A winding road that repulses.



Above: A young lemon grove with newly set avocado trees in the foreground. (Ventura County, California).

Below: A quiet spring afternoon in Lancaster County, Pennsylvania.

The Editors Talk

Our Cover Picture

This month our cover illustration shows potash-starved and healthy mint plants. These were taken from plots in a long-time experiment at the Michigan Muck Experimental Farm near East Lansing, Michigan, conducted by Michigan State University. The one at the right is vigorous with many large, glossy, green leaves which give the best yield and quality of peppermint oil. It came from a plot receiving 500 pounds of 5-10-30 fertilizer annually. The stunted, potash-starved plant at the left came from a 5-20-0 plot. It has fewer branches, and the leaves are small and abnormal. A close examination of the small, potash-hungry peppermint leaves will show yellowish margins which often turn brown, especially near the tips. Some yellowing between the veins gives a general yellowish effect from a distance. The symptoms are quite similar to the potash-hunger signs on the leaves of many plants.

While not one of the more important crops (acreage-wise) in this country, American farmers grow upwards of 50,000 acres of mint annually. It has been cultivated in northern Indiana and southern Michigan for more than 100 years and in 1925 this area was credited with the production of more than three fourths of the world's supply of true peppermint oil. More recently there has been an appreciable production of mint in the Pacific Northwest.

According to Purdue University bulletin No. 461, "A Study of Some Factors Affecting the Yield and Market Value of Peppermint Oil," the peppermint plant and the oil extracted from it have been used for centuries by the medical profession. The distillation of plant material was known by the ancients although the oldest written record apparently was made in 410 A. D. In 984, a Japanese medical book mentioned the use of peppermint oil in an eye-wash. Peppermint, as it is known today, was first described by John Ray of England in 1696. Distillation of the herb to obtain the oil must have begun soon afterward in England.

Potash fertilizers may seem unrelated to the peppermint oil used to flavor chewing gum, candies, dentifrices, and bad-tasting medicines, as well as to that used as a drug and a mild anaesthetic, in perfumes, and many other products. But potassium fertilizers are essential links in the growing of healthy mint plants from which good quality oil can be extracted by steam distillation. In the Midwest, peppermint usually is grown on organic soils, often termed peat or muck, most of which are naturally low in available potassium.

Potash has been credited not only with stimulating growth but with darkening the foliage and combating chlorosis caused by too much water in the soil. It lessens lodging and tends to prevent leaf scorch which leads to shattering. It has improved oil quality and increased menthol content.

Mint stands are established by planting root stolon cuttings in a furrow or from transplants. New plants develop at stolon nodes, and the expansion continues by further growth of stolons which start still more new plants. Balanced

nutrient supplies help new plants get a vigorous early growth, which favors an even stand. Proper fertilization boosts the growth of leafy hay, so essential to large yields of mint oil per acre.

The "Non-farm" Use of Fertilizer

In this year's February issue of this magazine, we were privileged to present an article, "Fertilizer Statistics from the 1954 Census of Agriculture." A. L. Mehring, the author, among other factual data, reported the estimated "non-farm" usage as 1,900,000 tons or 9.1% of the total fertilizer used in 1954. By "non-farm" is meant lawns and gardens in cities and towns, roadsides, parks, airports, etc.

What is particularly interesting about these figures is that they place "non-farm" use as the third most important outlet for fertilizers in this country, being exceeded only by corn and cotton. The other crops considered in the tabulation included pasture, wheat, commercial vegetables, oats, tobacco, hay, fruits, and potatoes. Probably a much greater number of people are using fertilizer for "non-farm" purposes than are using it for all farm crops, but because of the smaller amount involved in individual usage, it is easy to overlook the impressive total of the aggregate.

The fertilizer industry, by and large, has possibly tended to neglect this important potential for greater sales. One might wonder how much this market could be increased by more effort on the part not only of the sales forces but the educational groups. The problems involved in "non-farm" usage are frequently complex and difficult. Many lawns and flower beds consist of raw subsoil, thrown up in making excavations for the foundations of homes and then covered by a thin layer of rich-looking topsoil. The fertility of such a combination can be developed, but different treatment than that used on the ordinarily cultivated field soil probably would be required.

Because of lack of economic pressure, little work has been done on the investigation of problems involved in "non-farm" usage. This is all the more unfortunate since the situation admittedly is complex even for people trained in the use of plant food. The unsuspecting suburbanite injected into this situation is to be pitied rather than criticized for poor-looking lawn and plantings around his home.

To help provide some of the needed information, several books on home plantings have been prepared. One of the best is "The Care and Feeding of Garden Plants" published in 1954 by the American Society of Horticultural Science and the National Plant Food Institute. With chapters written by well-recognized authorities, the book is designed and profusely illustrated to acquaint the home-gardener with plant-hunger signs, tell him what makes plants grow, and how. This is an excellent addition to available guidance for the "non-farm" user of fertilizer. That there will be others is assured by the rapidly growing movement to home-ownership and suburban development being generated by "good times," full employment, and the ever-ready automobile.

"Farming isn't just men and land and animals and machines. It's one of the most exciting laboratories in the world today. It holds promise of vastly greater material benefits to man than he has ever known since the beginning of time." —*Ezra Taft Benson, Secretary of Agriculture.*

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb. Aug.-July	Tobacco Cents per lb.	Potatoes Cents per bu. July-June	Sweet Potatoes Cents per bu. July-June	Corn Cents per bu. Oct.-Sept.	Wheat Cents per bu. July-June	Hay [1] Dollars per ton July-June	Cottonseed Dollars per ton July-June	Truck Crops ....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	28.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	78.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	69.8	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	73.4	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.4	61.8	68.2	7.59	21.73	....
1941.....	17.0	26.4	80.8	92.2	75.1	94.4	9.70	47.65	....
1942.....	19.0	36.9	117.0	118.0	91.7	110.0	10.80	45.61	....
1943.....	19.9	40.5	131.0	206.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	42.0	150.0	190.0	109.0	141.0	16.50	52.70	....
1945.....	22.5	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946.....	32.6	38.2	124.0	218.0	156.0	191.0	16.70	72.00	....
1947.....	31.9	38.0	162.0	217.0	216.0	229.0	17.60	85.90	....
1948.....	30.4	48.2	155.0	222.0	129.0	200.0	18.45	67.20	....
1949.....	28.6	45.9	128.0	214.0	124.0	188.0	16.50	43.40	....
1950.....	40.1	51.7	91.7	173.0	153.0	200.0	16.70	86.50	....
1951.....	37.9	51.1	163.0	304.0	166.0	211.0	19.50	69.30	....
1952.....	34.6	49.9	198.0	338.0	153.0	209.0	19.95	69.60	....
1953.....	32.3	52.2	78.1	244.0	148.0	204.0	17.45	52.60	....
1954.....	33.6	51.4	123.0	216.0	143.0	214.0	17.35	60.30	....
1955									
April.....	31.93	....	217.0	315.0	136.0	209.0	17.65	53.40	....
May.....	31.51	46.0	223.0	315.0	140.0	213.0	17.45	53.10	....
June.....	31.43	39.5	121.0	392.0	140.0	206.0	16.35	52.00	....
July.....	32.11	38.0	88.0	279.0	140.0	197.0	15.25	54.00	....
August.....	32.74	50.6	75.2	179.0	130.0	190.0	15.25	50.10	....
September...	33.77	51.5	71.3	142.0	124.0	192.0	15.55	43.70	....
October.....	32.83	55.0	72.3	144.0	114.0	194.0	15.75	43.50	....
November...	32.42	52.5	82.9	168.0	109.0	194.0	16.05	44.30	....
December....	31.19	57.2	80.7	203.0	115.0	195.0	16.55	45.00	....
1956									
January.....	30.67	51.3	99.4	199.0	116.0	195.0	16.55	45.50	....
February....	31.00	35.4	114.0	198.0	118.0	195.0	16.45	46.20	....
March.....	31.64	....	134.0	209.0	120.0	197.0	15.85	46.80	....
Index Numbers (Aug. 1909–July 1914 = 100)									
1930.....	77	128	131	123	93	76	93	98	128
1931.....	46	82	66	83	50	44	73	40	107
1932.....	52	105	55	62	50	43	52	46	100
1933.....	82	130	118	79	81	84	68	57	90
1934.....	100	213	64	91	127	96	111	146	94
1935.....	90	184	85	80	102	94	63	135	116
1936.....	100	236	164	106	163	116	94	148	108
1937.....	68	204	76	89	81	109	74	87	114
1938.....	69	196	80	79	76	64	57	97	96
1939.....	73	154	100	84	88	78	67	94	98
1940.....	80	160	78	97	96	77	64	96	122
1941.....	137	264	116	105	117	107	82	211	138
1942.....	153	369	168	134	143	124	91	202	178
1943.....	160	405	188	235	174	154	125	231	270
1944.....	167	420	214	216	170	160	139	234	236
1945.....	181	366	205	232	198	170	127	227	240
1946.....	263	382	178	248	212	209	141	319	217
1947.....	257	380	232	248	336	259	148	381	262
1948.....	245	482	222	253	201	226	155	298	253
1949.....	231	459	184	244	193	213	139	192	232
1950.....	323	517	132	197	238	226	141	384	211
1951.....	306	512	233	346	259	239	164	307	269
1952.....	279	499	284	385	238	236	168	309	274
1953.....	260	522	112	278	231	231	147	233	240
1954.....	270	514	176	246	223	242	146	267	228
1955									
April.....	258	...	311	359	212	236	149	237	270
May.....	154	460	320	359	218	241	147	235	308
June.....	253	395	174	435	218	233	138	231	230
July.....	259	380	126	318	218	223	128	239	223
August.....	264	506	108	204	202	215	128	222	211
September...	272	515	102	162	193	217	131	194	230
October.....	265	550	104	164	178	219	133	193	223
November...	261	525	119	191	170	219	135	196	231
December....	252	572	118	231	179	221	139	200	231
1956									
January.....	247	513	143	227	181	221	139	202	244
February....	250	354	164	226	184	221	139	205	244
March.....	255	...	192	238	187	223	134	208	290

Wholesale Prices of Phosphates and Potash * *

	Superphosphate, Baltimore, per unit	Florida land, pebble, 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports [2]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports [2]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports [2]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports [2]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947	.746	3.05	6.60	.432	.706	18.93	.195
1948	.764	4.27	6.60	.397	.681	14.14	.195
1949	.770	3.88	6.22	.397	.703	14.14	.195
1950	.763	3.83	5.47	.371	.716	14.33	.195
1951	.813	3.98	5.47	.401	.780	15.25	.200
1952	.849	3.98	5.47	.401	.793	15.25	.200
1953	.878	....	....	.410	.793	15.25	.200
1954	.895	....	....	.405	.791	15.27	.200
1955							
April	.895	....	....	.405	.825	16.00	.193
May	.895	....	....	.405	.825	16.00	.193
June	.895	....	....	.360	.720	13.45	.175
July	.895	....	....	.380	.735	14.00	.193
August	.895	....	....	.380	.735	14.00	.193
September	.895	....	....	.380	.735	14.00	.193
October	.895	....	....	.380	.735	14.00	.193
November	.895	....	....	.380	.735	14.00	.193
December	.895	....	....	.380	.735	14.00	.193
1956							
January	.895	....	....	.380	.735	14.00	.193
February	.895	....	....	.380	.735	14.00	.193
March	.895	....	....	.380	.735	14.00	.193
	Index Numbers (1910-14 = 100)						
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947	139	84	135	70	74	78	83
1948	143	118	135	67	72	58	83
1949	144	108	128	67	74	58	83
1950	142	106	112	68	75	59	83
1951	152	110	112	72	82	63	83
1952	158	110	112	72	83	63	83
1953	164	...	...	73	83	63	83
1954	167	...	...	72	83	63	83
1955							
April	167	...	...	72	87	66	83
May	167	...	...	72	87	66	83
June	167	...	...	66	76	56	80
July	167	...	...	69	77	58	82
August	167	...	...	69	77	58	82
September	167	...	...	69	77	58	82
October	167	...	...	69	77	58	82
November	167	...	...	69	77	58	82
December	167	...	...	69	77	58	82
1956							
January	167	...	...	69	77	58	82
February	167	...	...	69	77	58	82
March	167	...	...	69	77	58	82

Wholesale Prices of Ammoniates * *

	Nitrate of soda bulk per unit N	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish, scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17 % ammonia, Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947	2.50	1.60	12.72	10.66	12.63	10.46
1948	2.86	2.03	12.94	10.59	10.84	9.85
1949	3.15	2.29	10.11	13.18	10.73	10.62
1950	3.00	1.95	11.01	11.70	10.21	9.36
1951	3.16	1.97	13.20	10.92	10.18	10.09
1952	3.34	2.09	13.95	11.27	9.72	9.16
1953	3.26	2.27	11.04	11.19	7.39	7.09
1954	3.07	2.20	11.50	11.63	9.72	9.85
1955						
April	2.98	2.18	9.90	12.41	6.68	6.23
May	2.98	2.16	9.97	11.92	6.19	6.25
June	2.98	2.02	9.91	11.55	6.23	5.92
July	2.98	2.02	10.01	9.43	6.68	7.14
August	2.98	2.07	9.88	11.12	7.04	6.86
September	2.98	2.05	9.30	11.60	6.75	6.53
October	2.98	2.07	9.17	13.01	7.47	7.16
November	2.98	2.07	8.71	13.10	6.14	6.23
December	2.98	2.12	9.21	12.93	5.66	6.00
1956						
January	2.98	2.12	9.43	12.75	5.58	5.58
February	2.98	2.12	8.69	12.15	5.77	5.69
March	2.98	2.12	8.30	11.89	5.92	5.92
Index Numbers (1910-14 = 100)						
1930	92	64	137	141	112	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947	93	56	363	302	374	297
1948	107	71	370	300	322	280
1949	117	80	289	373	318	302
1950	112	68	315	331	303	266
1951	118	69	377	310	302	287
1952	125	74	399	319	288	260
1953	122	80	315	317	219	201
1954	114	77	329	330	288	280
1955						
April	111	76	283	352	198	177
May	111	76	285	338	184	178
June	111	71	283	327	185	168
July	111	71	286	267	198	203
August	111	73	282	315	209	195
September	111	72	266	329	200	186
October	111	73	262	369	222	203
November	111	73	249	371	182	177
December	111	74	263	366	168	170
1956						
January	111	74	269	361	166	159
February	111	74	248	344	171	162
March	111	74	237	337	176	168

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1930.....	125	140	126	105	72	131	101	99
1931.....	87	119	107	83	62	83	90	99
1932.....	65	102	95	71	46	48	85	99
1933.....	70	104	96	70	45	71	81	95
1934.....	90	118	109	72	47	90	91	72
1935.....	109	123	117	70	45	97	92	63
1936.....	114	123	118	73	47	107	89	69
1937.....	122	130	126	81	50	129	95	75
1938.....	97	122	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	130	127	86	56	130	120	77
1942.....	159	149	144	93	57	161	112	77
1943.....	193	165	151	94	57	160	117	77
1944.....	197	174	152	96	57	174	120	76
1945.....	207	180	154	97	57	175	121	76
1946.....	236	197	177	107	62	240	125	75
1947.....	276	231	222	130	74	362	139	72
1948.....	287	250	241	134	89	314	143	70
1949.....	250	240	226	137	99	319	144	70
1950.....	258	246	232	132	89	314	142	72
1951.....	302	271	258	139	93	331	152	76
1952.....	288	273	251	144	98	333	158	76
1953.....	258	262	247	139	100	269	164	77
1954.....	249	264	248	142	95	311	167	76
1955								
April.....	247	265	248	135	93	252	167	77
May.....	244	263	248	134	93	243	167	77
June.....	243	263	248	131	90	242	167	70
July.....	237	262	248	131	90	240	167	72
August....	233	260	248	133	91	252	167	72
September.	235	259	250	132	91	244	167	72
October...	230	261	250	134	91	259	167	72
November.	225	259	250	131	91	235	167	72
December..	223	259	250	131	92	232	167	72
1956								
January...	226	259	252	131	92	232	167	72
February..	226	259	252	130	92	225	167	72
March....	230	261	254	130	92	222	167	72

* U. S. D. A. figures, revised January 1950. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning July 1949, baled hay prices reduced by $4.75 a ton to be comparable to loose hay prices previously quoted.

[2] Potash salts quoted F.O.B. mines; manure salts since June 1941; other carriers since June 1947.

**** Where range of prices for fertilizer material is quoted, average figure is used. The weighted average of prices actually paid for potash is lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Tonnage of Commercial Fertilizer Reported by Manufactures as Sold in Kansas in the Fall of 1955, by Counties, July 1, 1955 to December 31, 1955," State Dept. of Agr., Topeka, Kans.

"Fertilizers—Their Purchase and Use on Field Crops for 1956," Agr. Ext. Serv., Univ. of Ky., Lexington, Ky., Misc. 10 (Rev.), Dec. 1955, H. F. Miller and G. D. Corder.

"Missouri Fertilizer Tonnage Report, 1955," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo.

"Fertilizer Experiments with Corn and Grain Sorghum in Nebraska, 1955," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Outstate Testing Cir. 51, Dec. 1955, G. W. Lowrey, P. L. Ehlers, and F. V. Pumphrey.

"Twenty-sixth Annual Report of the N. Mex. Feed and Fertilizer Control Service," State Dept. of Agr., Feed and Fert. Control Office, State College, N. Mex., December 31, 1955.

"Soil and Crop Factors for Fertilizer Recommendations, 1956," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Mimeo. Cir. M-274, Feb. 1956.

"Minor Elements for Field Crops for South Carolina, 1956," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 104, Jan. 1956, N. R. Page.

"Wheat Fertilizer Test, Amarillo Experiment Station, 1955," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1840, Jan. 23, 1956, K. B. Porter.

"Distribution of Fertilizer Sales in Texas, July 1 to December 31, 1955," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1843, Feb. 3, 1956, J. F. Fudge.

"Grain Sorghum Fertility Trial at Denton, 1955," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1844, Feb. 9, 1956, P. A. Rich and D. I. Dudley.

Soils

"Your Soil Testing Service," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., Ext. Fldr. 124, Jan. 1956, S. L. Tisdale.

"Tillage Principles in Preparing Land for Corn," Agr. Exp. Sta., Wooster, Ohio, Res. Cir. 30, March 1956, C. J. Willard, G. S. Taylor, and W. H. Johnson.

"Rapid Soil Testing Procedures at Virginia Polytechnic Institute," Agr. Exp. Sta., Va. Polytechnic Institute, Blacksburg, Va., Bul. 475, Aug. 1955, C. I. Rich.

"Organic Matter Improves the Soil," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Bul. 516, June 1955, R. E. Taylor, O. E. Hays, and C. E. Bay.

"How to Recognize Erosion in the Northeast," USDA, Wash., D. C., Agr. Inf. Bul. 27, Rev. Jan. 1956, W. W. Reitz.

"A Chronological History of the Soil Conservation Service and Related Events," USDA, Wash., D. C., SCS-CI-1, Dec. 1955, R. L. Geiger, Jr.

"Soil Survey, Mendota Area, California," Series 1940, No. 18, USDA, Wash., D. C.

Crops

"Pastures in Alabama," Agr. Ext. Serv., Ala. Polytechnic Institute, Auburn, Ala., Cir. 477, June 1955, J. C. Lowery and D. R. Harbor.

"Annual Report of the Arizona Agricultural Experiment Station for the 66th Year Ending June 30, 1955," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz.

"1955 Corn Variety Tests," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Rpt. No. 127, March 1956, A. D. Day.

"Report of the Minister of Agriculture for Canada for the Year Ended March 31, 1955," Minister of Agr., Ottawa, Ont., Can., July 1955.

"Horticulture Division, Central Experimental Farm, Ottawa, Progress Report 1949-53," Exp. Farms Serv., Dept. of Agr., Ottawa, Ont., Can.

"Annual Flowers for Canadian Gardens," Exp. Farms Serv., Dept. of Agr., Ottawa, Ont., Can., Pub. 796, Rev. May 1955, R. W. Oliver.

"Field Corn and Sweet Corn Report for 1955, Mount Carmel, Connecticut," Agr. Exp. Sta., New Haven, Conn., Rpt. of Prog. G1, Feb. 1956, D. F. Jones, H. T. Stinson, A. P. Munson, and J. G. Buchert.

"Georgia Corn Performance Trials 1955," Agr. Exp. Sta., Univ. of Ga., Athens, Ga., Jan. 1956, A. A. Fleming, et al.

"Georgia Red Sweetpotato Introduction," Agr. Exp. Sta., Univ. of Ga., Athens, Ga., Mimeo. Series N. S. 16, Feb. 1956, S. Harmon and O. J. Woodard.

"Thirty-eighth Annual Report of the Department of Agriculture for the Fiscal Year July 1, 1954—June 30, 1955," State Dept. of Agr., Springfield, Ill., Nov. 1955.

"Christmas Trees Purchased by Families in a Medium-sized City," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Sta. Cir. 416, R. C. Brundage, W. Nicewander, and R. L. Kohls.

"Small Grain Varieties for Indiana," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Sta. Cir. 417, Jan. 1956, Small Grain Improvement Coordinating Committee.

"Performance of Dent Corn Hybrids in Indiana 1951-1955," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Sta. Bul. 634, Dec. 1955, P. L. Crane, J. E. Newman, and S. R. Miles.

"Annual Report of the Extension Director for the Year Ended December 31, 1954," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky.

"Seeding and Growing Black (Yellow) Locust Trees," Agr. Ext. Serv., Univ. of Ky., Lexington, Ky., Cir. 531, June 1955, W. E. Jackson.

"The Value of Pastures in Rotation with Rice," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., Bul. 498, June 1955, D. E. Black and R. K. Walker.

"Growing and Marketing Maine Potatoes for Chips," Agr. Ext. Serv., Univ. of Maine, Orono, Maine, Bul. 449, Feb. 1956, A. C. Hazlett and P. N. Mosher.

"Producing Asparagus in Michigan," Agr. Ext. Serv., Mich. State Univ., East Lansing, Mich., Ext. Fldr. F-209, Feb. 1956, S. K. Ries.

"Soybeans for Minnesota," Agr. Ext. Serv., Univ. of Minn., St. Paul, Minn., Ext. Bul. 134, Rev. Jan. 1956, E. H. Jensen, J. W. Lambert, A. C. Caldwell, and M. F. Kernkamp.

"Uniform Winter Cover Crop Tests, Stoneville, Miss.," Agr. Exp. Sta., Miss. State College, State College, Miss., Cir. 200, Nov. 1955, H. W. Johnson.

"Alfalfa Variety Yield Trials in Nebraska," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Outstate Testing Cir. 52, March 1956, W. R. Kehr, P. L. Ehlers, and F. V. Pumphrey.

"Leaf Scorch," Agr. Ext. Serv., Rutgers Univ., New Brunswick, N. J., Lflt. 133, May 1955, S. H. Davis, Jr.

"Digestibility of Range Grasses and Grass-legume Mixtures," Agr. Exp. Sta., N. Mex. A. & M. College, State College, N. Mex., Bul. 400, July 1955, W. E. Watkins.

"Estimating Corn Yields," Agr. Ext. Serv., N. C. State College, Raleigh, N. C., Ext. Fldr. 123, Nov. 1955, E. R. Collins.

"Consumer Preferences for Cut Roses, Carnations, Chrysanthemums," Agr. Exp. Sta., Wooster, Ohio, Res. Cir. 31, March 1956, R. W. Sherman, D. C. Kiplinger, and H. C. Williams.

"A Feed Crop Rotation for Central and Eastern Oklahoma," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Bul. B-465, Jan. 1956, F. Gray and H. J. Harper.

"Black Raspberry Growing," Agr. Ext. Serv., Oreg. State College, Corvallis, Oreg., Ext. Bul. 750, Oct. 1955, G. F. Waldo and C. O. Rawlings.

"Apple Varieties in Central Pennsylvania," Agr. Exp. Sta., Pa. State Univ., University Park, Pa., Bul. 605, Oct. 1955, W. S. Clarke, Jr. and C. M. Ritter.

"Sixty-sixth Annual Report of the South Carolina Agricultural Experiment Station," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Dec. 1954.

"Recommended Field and Vegetable Crop Varieties for South Carolina, 1956," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 102, Jan. 1956.

"Coastal Burmuda for Grazing, Hay and Silage," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 406, June 1955, H. A. Woodle.

"Agronomy Handbook for South Carolina," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 407, May 1955.

"The 1955 Cotton Contest," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 412, Jan. 1956, S. A. Williams.

"1956 Grassland and Pasture Contests in South Carolina," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 414, Jan. 1956, H. A. Woodle.

"1955 State Corn Contest," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 415, Feb. 1956, H. A. Woodle.

"Good Windbreaks Help Increase South Dakota Crop Yields," Agr. Exp. Sta., S. Dak. State College, Brookings, S. Dak., Cir. 118, Sept. 1955, A. E. Ferber, A. L. Ford, and S. A. McCrory.

"Weather Effects on Yields of Tomato Varieties," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1849, Feb. 18, 1956, P. A. Young.

"Hot Pepper Variety Test in the Lower Rio Grande Valley, Spring, 1955," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1850, Feb. 21, 1956, R. T. Correa.

"Large Yields and Better Quality Tobacco," Agr. Exp. Sta., Va. Polytechnic Institute, Blacksburg, Va., Cir. 386, Rev. Jan. 1956.

"Facts About Forest Improvement Practices," Agr. Ext. Serv., Va. Polytechnic Institute, Blacksburg, Va., Cir. 674, Jan. 1956.

"Facts About Forest Establishment (Tree Planting) Practices," Agr. Ext. Serv., Va. Polytechnic Institute, Blacksburg, Va., Cir. 675, Jan. 1956.

"Tobacco Diseases in Virginia and Their Control," Agr. Ext. Serv., Va. Polytechnic Institute, Blacksburg, Va., Rev. Bul. 152, Jan. 1956, S. B. Fenne.

"Results of Hybrid Corn Yield Trials in West Virginia, 1955," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Curr. Rpt. 12, Feb. 1956, W. L. Haltiwanger, R. J. Friant, and V. L. Bolyard.

"Flowering Potted Plants," Agr. Ext. Serv., Univ. of Wis., Madison, Wis., Cir. 511, Oct. 1955.

"Vegetable Varieties and High-altitude Freezing," Agr. Exp. Sta., Univ. of Wyo., Laramie, Wyo., Bul. 335, July 1955, E. J. Thiessen.

"Wheatgrasses of Wyoming," Agr. Exp. Sta., Univ. of Wyo., Laramie, Wyo., Bul. 336, Sept. 1955, A. A. Beetle.

"Growing Pumpkins and Squashes," USDA, Wash., D. C., Farmers' Bul. 2086, Nov. 1955, R. C. Thompson, S. P. Doolittle, and D. J. Caffrey.

"Growing Fruits and Nuts in the Southern Great Plains," USDA, Wash., D. C., Farmers' Bul. 2087, Nov. 1955, L. F. Locke.

"Seeding Summer Ranges in Eastern Oregon and Washington," USDA, Wash., D. C., Farmers' Bul. 2091, Oct. 1955, R. S. Rummell and C. E. Holscher.

"Managing Farm Fish Ponds for Bass and Bluegills," USDA, Wash., D. C., Farmers' Bul. 2094, Nov. 1955, V. E. Davison.

"Buckwheat Culture," USDA, Wash., D. C., Farmers' Bul. 2095, Feb. 1956, W. J. Sando.

"Growing Loblolly Pine in the South Atlantic States," USDA, Wash., D. C., Farmers' Bul. 2097, Feb. 1956, T. Lotti.

"Making and Maintaining a Good Lawn," USDA, Wash., D. C., Picture Story No. 96, March 4, 1956.

Economics

"The Agricultural Outlook for Canada, 1956," Dept. of Agr., Ottawa, Ont., Can.

"Crop, Livestock and Marketing Review for 1954," State Dept. of Agr., Hartford, Conn., Bul. 133, Dec. 1955.

"Connecticut Vegetable Acreages, 1952-1955," State Dept. of Agr., Hartford, Conn., Bul. 134, Jan. 1956.

"Marketing Georgia Cantaloupes," Agr. Ext. Serv., Univ. of Ga., Athens, Ga., Cir. 390, June 1955, W. C. Carter.

"Marketing Georgia Sweet Corn," Agr. Ext. Serv., Univ. of Ga., Athens, Ga., Cir. 391, June 1955, W. C. Carter.

"Optimum Allocation of Resources Between Pasture Improvement and Other Opportunities on Southern Iowa Farms," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Res. Bul. 435, Jan. 1956, D. E. McKee, E. O. Heady, and J. M. Scholl.

"Opportunities for the Dairy Herd on Maine Potato Farms," Agr. Ext. Serv., Univ. of Maine, Orono, Maine, Bul. 447, Jan. 1956.

"Farm Accounts as a Source of Data for Farm Management Research," Agr. Exp. Sta., Univ. of Minn., St. Paul, Minn., Tech. Bul. 219, Feb. 1956, G. A. Pond.

"Crops and Livestock by Type of Farm in the Central Plain Region, New York, 1953-54," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., A. E. 1005, Oct. 1955, L. C. Cunningham and W. W. Peek.

"Farm Investment and Income by Type of Farm in the Central Plain Region, New York, 1953-54," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., A. E. 1006, Oct. 1955, L. C. Cunningham.

"Ohio Agricultural Statistics for 1953 and 1954," Agr. Exp. Sta., Wooster, Ohio, Res. Bul. 767, Dec. 1955, B. U. Kienholz, J. R. Kendall, M. G. Smith, and H. Greenbaum.

"Education of the Oklahoma Farm Population," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Bul. B-466, Feb. 1956, J. D. Tarver.

"Economic Potentials of Irrigated and Dryland Farming in Central South Dakota," Bul. 444, May 1955, R. D. Helfinstine.

"Characteristics and Changes in the Texas Farm Population," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Bul. 825, Dec. 1955, R. L. Skrabanek.

"Dairy Pasture Improvement Practices and Costs," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1839, Jan. 18, 1956, A. C. Magee, B. H. Stone, and R. H. Rogers.

"Consumer Acceptance of Tomatoes Offered in Bulk, in Cartons and at Varying Prices," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1847, Feb. 15, 1956, H. B. Sorensen, J. M. Ward, and L. H. Hammond.

"Wisconsin Peas and Sweet Corn, Production and Marketing," State Dept. of Agr., Madison, Wis., Spec. Bul. 52, Feb. 1955, R. L. Packard.

"A Graphic Method of Interpreting Response to Fertilizer," USDA, Wash., D. C., Agr. Handbook No. 93, Jan. 1956, D. B. Ibach.

"The Farmer and Old-age Security, a Summary Analysis of Four Studies, 1951-54," USDA, Wash., D. C., Agr. Inf. Bul. 151, Dec. 1955, I. M. Baill.

"Supplement for 1954 to Consumption of Food in the United States, 1909-52," USDA, Wash., D. C., Agr. Handbook No. 62, Oct. 1955.

"Production, Farm Disposition, and Value, Principal Fruits and Tree Nuts, 1954 and 1955 Seasons," USDA, Wash., D. C., Ann. Rpt., Jan. 1956.

"Production Expenses of Farm Operators, by States, 1949-54," USDA, Wash., D. C., AMS-85, Jan. 1956.

"Measuring and Marketing Farm Timber," USDA, Wash., D. C., Farmers' Bul. 1210, Rev. Oct. 1955.

"Economic Factors in Marketing Farmers' Castorbeans," USDA, Wash., D. C., Mktg. Res. Rpt. 106, Nov. 1955, G. W. Kromer.

TABLE XII.—THE RELATIONSHIP OF QUALITY OF THE COVER CROP TO THE SOIL NITROGEN LEVEL OF THE FOLLOWING CORN CROP. (FIELD C-89) 1955

Treatment	Cover crops			Soil nitrogen level (lbs./A)*								
					With cover crop			With peas			With lima beans	
	Total dry wt. lbs./A	% N t & r Av.	Total N lbs./A	After corn 8/20	10/7	3/9	4/6	5/11	6/4	6/14	7/12	7/29
All grass plots:												
No nitrogen	5,510	.76	41	25	5	3	4	19	15	7	12	8
60 lbs. N.	6,120	1.86	108	30	5	3	6	35	32	11	24	24
120 lbs. N.	6,660	2.54	166	51	5	4	18	72	64	22	38	39
With c. clover	7,300	1.27	91	47	8	4	4	34	22	9	18	10
C. clover alone	2,000	2.20	44	64	6	4	2	31	22	6	17	13
L. clover alone	2,670	2.25	60	35	6	5	5	48	42	13	24	25

Cover crop planted: Sept. 7, 1954
Nitrogen applied: March 10, 1955
All plots fertilized: April 7, 1955
(800 lbs./A 4–12–16)
(1,200 lbs./A dolomitic limestone)

Cover crop plowed: April 8, 1955
Peas planted: April 11, 1955
Peas harvested: June 12, 1955
Field plowed: June 16, 1955
Lima beans planted: June 17, 1955

* Soluble nitrogen—average of ryegrass, rye, wheat, barley, and orchardgrass plots.

The Value of Green Manure Crops . . .

(*From page* 16)

TABLE XIII.—QUALITY OF COVER CROP MEASURED IN TERMS OF PERCENTAGE OF NITROGEN AT DIFFERENT PERIODS FOLLOWING THE SEEDING IN SEPTEMBER 1954, UNTIL APRIL 24, 1955. (FIELD P-3A)

Treatments	12/8	3/11	4/7	4/18	4/24
Ryegrass					
No nitrogen	2.70	2.15	1.82	1.75	1.40
60 lbs. N—Fall*	4.39	2.48	2.48	1.94	1.84
" " "—Spring*	.....	.....	2.80	2.24	1.61
120 lbs. N—Fall	4.86	2.46	2.85	2.28	1.68
" " "—Spring	.....	.....	3.43	2.89	2.73
in mixture	3.02	1.94	1.76	1.16	1.13
Rye					
No nitrogen	3.04	1.74	1.23	1.13	0.58
60 lbs. N—Fall	4.42	2.35	1.98	1.45	0.96
" " "—Spring	.....	.....	2.08	1.61	1.17
120 lbs. N—Fall	4.94	3.00	2.00	1.65	1.07
" " "—Spring	.....	.....	2.45	2.47	1.18
in mixture	3.25	2.36	1.27	1.21	0.81
Wheat					
No nitrogen	3.66	1.75	1.64	1.08	1.18
60 lbs. N—Fall	4.32	2.09	1.70	1.56	1.35
" " "—Spring	.....	.....	1.86	2.13	1.57
120 lbs. N—Fall	4.21	2.95	2.02	1.63	1.51
" " "—Spring	.....	.....	2.65	2.29	2.02
in mixture	3.30	1.44	1.29	1.25	0.97
Barley					
No nitrogen	4.07	2.59	1.69	1.52	0.82
60 lbs. N—Fall	4.52	2.71	1.99	2.13	1.12
" " "—Spring	.....	.....	2.26	2.59	1.60
120 lbs. N—Fall	4.75	2.88	2.07	2.23	1.42
" " "—Spring	.....	.....	3.32	2.34	1.99
in mixture	3.89	2.93	1.75	1.54	0.88
Orchardgrass					
No nitrogen	1.90	2.24	1.75	1.18	1.33
60 lbs. N—Fall	2.60	2.03	2.29	2.02	1.36
" " "—Spring	.....	.....	3.19	2.96	2.40
120 lbs. N—Fall	2.36	4.19	2.32	2.30	2.03
" " "—Spring	.....	.....	4.00	4.15	2.67
in mixture	1.50	2.13	2.13	1.94	1.52
Bromegrass					
No nitrogen	4.07	2.32	2.34	1.71	1.87
60 lbs. N—Fall	4.50	2.66	2.68	2.06	1.98
" " "—Spring	.....	.....	2.65	3.68	2.27
120 lbs. N—Fall	4.44	2.48	2.59	2.85	2.84
" " "—Spring	.....	.....	4.25	3.77	2.79
in mixture	3.86	2.14	2.71	2.50	1.69
C. clover	1.85	3.21	.....	2.93	2.22

* Fall application—10/12/54; Spring application—3/11/55.

EFFECT OF NITROGEN FERTILIZATION ON COVER CROPS UPON THE YIELD OF MARKETABLE HUSKED EARS OF SWEET CORN

Cover crops	No nitrogen	(lbs./A.) 60 lbs.	120 lbs.	Crimson clover
Ryegrass	5,640	6,031	7,120	3,980
Rye	3,810	5,010	5,410	3,750
Wheat	6,270	6,680	7,190	3,260
Crimson clover alone	.....	.....	.....	3,210

The greatest difference resulted from the fertilization of the rye, while wheat was the least. This is in keeping with the quality of the cover crops when plowed under. Rye and ryegrass receiving no nitrogen were the lowest in quality. When the corn plant was 30 days old, an analysis was made of the leaves to determine the amount of N, P, and K, it contained at that time. (Table XVII.)

Final results in terms of yield unquestionably were greatly influenced by availability of the nitrogen in the cover crop. Crimson clover alone produced the lowest yields of ears. There was a significant increase in the amount of nitrogen in the leaves of the crimson

TABLE XIV.—RELATION OF TOPS AND ROOTS OF VARIOUS COVER CROPS WITH VARIOUS NITROGEN TREATMENTS—FIRST YEAR. (C-89) 1954

Cover crops 4/26/54	Dry weight—pounds per acre					Percentage roots of dry wt.				
	No N.	60# N.	120# N.	with C.C.*	Av.	No N.	60# N.	120# N.	with C.C.	Av.
Ryegrass										
Tops	3,400	7,250	6,500	2,800	4,990					
Roots	1,050	2,000	1,100	750	1,225	24	22	15	21	20
Rye										
Tops	5,050	8,800	6,500	3,900	6,060					
Roots	650	700	550	650	640	11	7	8	14	10
Wheat										
Tops	6,200	7,400	11,500	2,900	7,000					
Roots	800	700	1,100	350	740	11	9	9	11	10
Barley										
Tops	5,300	5,500	8,400	5,200	6,100					
Roots	550	400	650	300	475	9	7	7	5	7
Bromegrass										
Tops	1,500	.....	4,000		2,750					
Roots	500	.....	2,000	.....	1,250	25	.....	33	.....	31
C. clover										
Tops	3,900	.....	.....	.....	3,900					
Roots	300	.....	.....	.....	300	.....	.....	.....	.....	7

* For grass only.

TABLE XV.—RELATION OF TOPS AND ROOTS OF VARIOUS COVER CROPS WITH VARIOUS NITROGEN TREATMENTS—SECOND YEAR. (C-89) 1955

Cover crops* 4/5/55	Dry weight—pounds per acre					Percentage roots of dry wt.				
	No N.	60# N.	120# N.	with C.C.	Av.	No N.	60# N.	120# N.	with C.C.	Av.
Ryegrass										
Tops	3,300	5,870	6,400	5,500	5,265					
Roots	3,230	2,630	1,830	2,070	2,440	49	31	22	27	32
Rye										
Tops	4,630	5,400	6,000	5,100	5,310					
Roots	1,770	1,480	1,470	1,330	1,510	28	22	20	21	23
Wheat										
Tops	4,070	5,070	5,500	5,470	5,025					
Roots	1,370	1,500	1,450	1,570	1,470	25	23	21	22	23
Barley										
Tops	5,430	5,270	5,700	4,830	5,305					
Roots	1,030	1,230	1,100	970	1,080	16	19	16	17	17
Orchardgrass										
Tops	1,800	1,570	2,630	1,400	1,850					
Roots	900	570	1,200	970	910	33	27	31	41	33
Bromegrass										
Tops	2,200	.....	3,500	.....	2,850					
Roots	1,000	.....	1,300	.....	1,150	31	.....	27	.....	29

* For grass only.

clover plots. Where crimson was grown as a companion crop, the corn was most luxuriant although the height was not any greater than 120 lbs. of nitrogen applied to the other cover crops. It produced more suckers when examined 30 days after planting. The deficiency of rainfall following this period reduced the yield of the plots having crimson clover probably because the proportion of the top to root was so much greater.

The main difference in the analysis of the leaves at the end of 30 days was nitrogen. At harvest time an analysis showed the nitrogen and potash content of the various parts of the plant, especially the stalk, to increase with the increased nitrogen applications and crimson clover. Phosphorus showed less change in the stalk.

In 1955 these plots were again cover-cropped with the same crop and same treatment and seeded to peas. There

ACRE YIELDS OF SEABROOK FARMS OF MAJOR CROPS

Peas

1931–1935	5-yr. av.	1,047 lbs.
1936–1940	" " "	1,516 "
1941–1945	" " "	2,295 "
1946–1950	" " "	1,974 "
1951–1955	" " "	2,747 "

Lima Beans

1935–1938	4-yr. av.	1,152 "
1939–1943	5 " "	1,061 "
1944–1948	5 " "	988 "
1949–1954	6 " "	1,399 "

Snap Beans

1940–1943	4-yr. av.	2,720 "
1944–1948	5 " "	3,196 "
1949–1954	6 " "	5,174 "

Fordhook Beans

1945–1948	4-yr. av.	1,219 "
1949–1954	6 " "	1,643 "

Spinach

1940–1943	4-yr. av.	3.70 T.
1944–1948	5 " "	4.40 "
1949–1954	6 " "	5.33 "

TABLE XVI.—INFLUENCE OF VARIOUS COVER CROPS UNDER DIFFERENT NITROGEN TREATMENTS OF THE WATER-STABLE SOIL AGGREGATES.

Treatment	Per cent aggregates					
	Initial	Before plowing	After plowing	During corn growth		
	9/29/53	4/20/54	5/13	6/14	7/16	8/20
Ryegrass —No nitrogen	32.7	35.4	40.2	37.1	36.4	50.6
" 60 lbs. N.	36.0	35.7	43.5	33.7	35.1	50.9
" 120 lbs. N.	35.2	37.8	39.3	35.3	47.3	46.2
" with c. clover	35.6	32.0	34.8	37.0	38.0	42.3
Wheat —No nitrogen	36.1	42.1	34.4	39.2	44.5	45.2
" 60 lbs. N.	35.7	39.1	38.3	36.2	45.6	44.3
" 120 lbs. N.	43.1	35.9	38.6	39.8	48.1	53.1
" with c. clover	34.9	34.2	36.7	31.4	35.1	38.2
Barley —No nitrogen	36.6	34.9	39.3	31.4	49.2	54.0
" 60 lbs. N.	36.1	30.2	38.4	34.6	37.2	44.8
" 120 lbs. N.	35.5	33.0	31.3	32.0	34.9	36.5
" with c. clover	33.7	33.0	30.8	29.7	36.6	39.0
Rye —No nitrogen	38.1	37.8	33.3	36.7	49.6	48.6
" 60 lbs. N.	33.0	31.2	34.3	33.9	35.0	41.5
" 120 lbs. N.	33.4	33.9	31.6	33.3	35.0	41.0
" with c. clover	36.1	39.3	38.1	35.3	44.7	45.5
Crimson clover	33.2	34.5	31.4	32.6	40.2	42.1
No cover —No nitrogen	37.7	26.6	31.0	27.4	34.2	36.1
" " 60 lbs. N.	33.7	28.1	28.8	26.5	39.5	47.0
" " 120 lbs. N.	38.8	32.4	34.3	31.4	44.3	34.9
No cover, no corn, no nitrogen	36.7	28.9	29.5	29.2	30.5	37.6
Bromegrass—No nitrogen	40.9	42.7	53.6	49.7	67.4	63.7
" 120 lbs. N.	36.0	37.7	43.8	42.6	38.2	47.0

again was a substantial increase where the cover crops were treated with nitrogen—16% with 60 lbs. nitrogen and 28% with 120 lbs. nitrogen. This, too, was during a dry season for peas. (Table XVIII.)

The results of fertilizing cover crops in the commercial operations started in 1949 illustrate the results commercially on a large scale. The average increase was approximately 40% in yield without any increase in the application of fertilizer.

For some crops there was a substantial decrease. At the same time for some crops we made a change in our source of nitrogen. This, too, influenced yield and to a large extent changed our farm practice for the use of fertilizer.

Research and Its Use for a Better Farm Practice

We have arrived at our present farm practice through research, pilot operations and measurements obtained commercially from the selected farm practices, including the use of cover crops. In addition, our procedure was influenced by research from many other sources. Our soils laboratory proved to be an invaluable asset to determine the application of much research already

TABLE XVII.—INFLUENCE OF NITROGEN FERTILIZATION OF COVER CROPS ON THE GROWTH AND NUTRIENT CONTENT OF THE FOLLOWING SWEET CORN 30 DAYS OLD. (FIELD C-89) 1954

Fresh weight of tops and roots of 30-day-old sweet corn

Cover crops	Tops (gms./4 pts.)				Roots (gms./4 pts.)			
	No N.	60# N.	120# N.	Crimson clover	No N.	60# N.	120# N.	Crimson clover
Ryegrass	314	439	553	589	41	51	67	61
Rye	383	401	711	733	53	43	74	78
Wheat	300	410	488	693	53	47	64	83
Barley	303	546	605	580	34	65	60	70
C. clover alone	.....	.....	.....	714	.....	.....	.....	70

Soluble and total nutrient content of 30-day-old sweet corn leaves

Cover crops	Soluble (p.p.m.)				Total (%)			
	No N.	60# N.	120# N.	with c.c.	No N.	60# N.	120# N.	with c.c.
Nitrogen								
Ryegrass	0.2	0.5	9.7	14.6	1.19	1.53	2.25	2.14
Rye	0.3	2.3	9.3	11.2	1.06	1.40	1.87	2.05
Wheat	0.2	1.2	9.5	8.1	1.10	1.66	2.35	2.11
Barley	0.1	2.3	9.3	11.2	1.41	1.93	2.62	2.81
Crimson	.....	.....	.....	.....	.....	.....	.....	.....
Clover alone	.....	.....	.....	16.2	.....	.....	.....	3.18
Phosphorus								
Ryegrass	2.2	1.7	1.8	1.5	.38	.35	.37	.35
Rye	2.3	1.6	1.4	1.5	.37	.32	.35	.36
Wheat	2.4	2.0	1.8	1.5	.35	.36	.36	.34
Barley	2.0	1.5	1.5	1.7	.32	.34	.33	.36
Crimson	.....	.....	.....	.....	.....	.....	.....	.....
Clover alone	.....	.....	.....	1.8	.....	.....	.....	.38
Potassium								
Ryegrass	35	45	51	37	5.08	5.17	5.48	5.07
Rye	39	40	38	37	4.48	4.28	4.72	4.52
Wheat	37	44	44	36	4.34	4.77	5.18	4.54
Barley	37	45	43	35	4.01	4.62	4.93	4.30
Crimson	.....	.....	.....	.....	.....	.....	.....	.....
Clover alone	.....	.....	.....	41	.....	.....	.....	4.98

reported. Through research we have been able to determine the factors required for the optimum growth of each crop. At the same time, we have established a sound system of soil conservation and a much more efficient use of our plant food purchased in the form of fertilizers. All of these are obtained

on formulas arrived at from research and tested carefully through pilot and commercial use. Sound soil management can be obtained only when we have an understanding of the particular factors that are important for the production of a given crop or a given soil and field. These factors serve as measures or yardsticks for the determination of farm practice. They have wide application and offer exceptional opportunity to increase the efficiency of our agriculture.

TABLE XVIII.—INFLUENCE OF NITROGEN FERTILIZATION OF COVER CROPS ON THE GROWTH OF PEA PLANTS. (THOMAS LAXTON) (FIELD C-89) 1955

Pea samples 25 plants 6/13/55	Cover-crop treatments		
	No nitrogen	60 lbs. N.	120 lbs. N.
Shelled peas (grams)			
Ryegrass	129	166	152
Rye	119	162	143
Wheat	128	138	172
Barley	111	132	133
Orchardgrass	121	120	151
Natural cover (weeds)	102	106	156
Average	118	137	151
% Difference over no N.		+16.1%	+28%
Pea pods (grams)			
Ryegrass	133	178	168
Rye	135	180	164
Wheat	147	178	199
Barley	123	152	147
Orchardgrass	133	135	149
Natural cover (weeds)	123	126	184
Average	132	158	169
% Difference over no N.		+18.1%	+28%
Pea vines (grams)			
Ryegrass	241	327	290
Rye	301	366	319
Wheat	321	356	395
Barley	253	313	279
Orchardgrass	293	259	331
Natural cover (weeds)	222	258	338
Average	272	313	326
% Difference over no N.		+15%	+20%

"HOLLOW-BELLY" Causes Milk Slump

"HOLLOW-BELLY" is a major cause of summer milk slumps in dairy herds, according to two Ohio State University specialists. R. R. Starbuck, Extension Dairyman, and Earl Jones, Extension Agronomist, say dairymen can maintain uniform summer production when cows have enough high quality forage to eat and that alfalfa-grass pastures produce more summer feed than permanent pastures.

To get maximum yields from alfalfa-grass pastures, Jones and Starbuck advise dividing them into small lots so cattle will graze the growth down in 3 to 7 days. This produces more feed per acre since it gives alfalfa and grass plants a chance to recover more quickly for later grazing. Temporary electric fences are satisfactory to divide fields where permanent fences aren't arranged for rationed grazing.

Alfalfa feeds heavily on potash, Jones reminds. He says that applying 200-300 pounds of 0-20-20, 0-10-20, or similar grade fertilizer per acre each year supplies the needed potash.

Fertility Program Helps Insure More Pasture in Dry Years

PASTURE farmers hurt least by the drought during the past two summers have been those who followed a sound fertility program. That's the observation of H. A. Cate, Extension Specialist at the Dixon Springs Experiment Station of the University of Illinois. High-fertility pastures in southern Illinois have had better stands to start with, have provided more forage in the spring when rains were sufficient, and have recovered more rapidly with fall rains.

Cate says a sound fertility program involves testing the soil and applying lime, phosphate, and potash according to need. On pasture lands, including grasses and legumes, topdressing annually with at least 200 pounds of 0-20-20 or its equivalent usually provides adequate fertility that will insure greater animal gains and be a great help in drought years.

Parts of pastures at the Dixon Springs Experiment Station receive different fertility treatments. Last summer parts of a pasture that had been topdressed with phosphate and potash produced over a ton of dry matter per acre more than parts that had not been topdressed. That's enough forage to carry a cow for about two months longer.

Cate points out that this increase in production came when both parts of the pasture had had good initial treatment. The increase would have been even greater if it had been compared with pasture receiving no treatment at all.

Soviet Farm and Family Life

(*From page* 21)

tural production in the Soviet Union could not be clearly defined. However, on the basis of observations and other reports, some general problem areas may be noted although no criteria are offered to ascertain their intensity.

Farm size, or scale of operations, is still an unsettled question even in America. However, in agriculture from preparation of the seedbed to harvesting the crop, jobs must be fitted into a seasonal pattern. Unlike a modern, large-scale factory there can be no detailed division of labor on the basis of different tasks. Nevertheless, farm directors in the Soviet Union attempt to operate farms like giant factories. It would appear, therefore, that when farms become very large, an optimum employment and output of labor during the year are extremely difficult to obtain. In the absence of adequate supplementary farm enterprises, as is the case in the country, the achievement of high labor efficiency becomes even more difficult. There are peaks and troughs in the demand for productive labor on both collective and state farms. When one observes the large quantity of labor used there as compared with one and two-man farms in the United States, an obvious conclusion is an inefficient use of farm labor.

Other factors of low farm efficiency in the Soviet Union are related to the almost total immobility of farm labor, giant size and cumbersome farm equipment, a lack of subsidiary pieces of equipment, and poor work simplification.

A second problem as related to giant size farms in the country would appear to lie in a lack of experience and training of farm directors and skilled technicians. One could ask whether farms of this size can ever be brought under highly skilled and efficient management when the simultaneous operations involved in agricultural production are spread over such very wide land areas.

Another serious weakness of Soviet agriculture lies, perhaps, in the bureaucratic nature of the entire Soviet economy, which through its ministries of agriculture in Moscow assumes full control and direct inflexible plans to numerous farms with very little allowance for adaptation to local conditions. The result is a denial of application of fundamental economic principles and little or no stimulus for individual initiative and creative production.

Shortage of fertilizer and other soil amendments and poor soil management are apparent. A severe shortage of numbers and quality of different types of livestock, feed for livestock, and low quality seed all should be added to general agricultural problems in the Soviet Union.

Finally, it would appear that inadequate facilities for transportation, processing, packaging, and handling and other aspects of distributing farm commodities result in losses and a restricted flow of goods and, therefore, less returns in agriculture.

Surveying Corn Fields by Tissue Tests

(*From page* 8)

tain this limited growth are changed. In other words, less total potassium is required to grow a plant that is already stunted by lack of nitrogen or phosphorus. Therefore, there tends to be an increase in the concentration of potassium in the plant limited in growth by lack of another nutrient. A tissue test showing high nitrogen, low phosphorus and medium potassium means only that the phosphorus is a limiting factor. With the application of phosphorus to that soil, the potassium test will then show low if the soil is not capable of supplying enough potassium to keep up with the increased growth.

Survey Results

Of the 125 fields, 58.4% were considered as lacking sufficient nitrogen, 29.6% were lacking sufficient phosphorus, and 25.6% were in need of additional potassium. In this study, nitrogen readings medium and below, and phosphorus and potassium readings low and very low were considered deficient.

Soil test results and the county agent's recommendations as to soil treatments were available. It is interesting to compare the survey results with the actual use of fertilizer materials to determine the effectiveness of the Missouri soil testing and recommendation program.

If we assume the soil testing and recommendation program is doing the job right, then we must also assume that where the recommended amounts of a nutrient are used by the farmer that nutrient is in adequate supply for the crop. Where he does not follow the recommendation, the nutrient is considered in inadequate supply. Such assumptions were made in these comparisons.

A comparison was made of the number of fields supplied with adequate nutrients according to soil test and the number of these fields which showed a need for the nutrient (N, P, or K) by tissue test. Three out of 38 fields which had adequate N were shown by tissue tests to be deficient. Fifteen out of 79 fields were deficient in phosphorus, but 13 out the 15 were 1955 rock phosphate applications. All fields which received an application of rock phosphate prior to 1955 showed adequate phosphate. Five out of 67 fields

showed a need for potassium.

In Figure 3, the number of fields receiving inadequate nutrients is compared with the number of fields found deficient by tissue test. Added to the latter column is the number of fields where another nutrient was a limiting factor. It represents a twilight area where the nutrient in question may or may not have been limiting had adequate applications of the other nutrients been applied. It may account for some or most of the differences between the number of fields where inadequate amounts of the nutrient were applied and the number of such fields showing adequate according to the tissue tests.

In a summary of this work, the farmers were classified as: (1) Those who followed the fertilizer recommendations based upon soil tests, (2) those who used only part of the recommendation, (3) those who used no fertilizer at all, and (4) those where the treatment or soil test results were not known. Figure 4 shows the relationship of the fertilizer treatment by the farmers to the tissue test results of their fields.

The indication of relatively little nutritional trouble on fields where the recommendation was followed is not surprising, nor is the fact that where no fertilizer was used, all the farmers were in difficulty. Where over half of the farmers surveyed had followed only a part of the recommendation, 86% of them were having nutritional trouble, certainly not as severe as where no fertilizer had been used, but still serious enough so they would not get top yields.

Helping the Farmer Do the Job

In Missouri, we find the farmers are very much interested in tissue tests, particularly when the test results call to their attention a mistake they have made in fertilizing or cultural practices. At field days and demonstration meetings, a tissue testing demonstration in the field is always an attraction for the farmer.

The tissue test survey on corn in Montgomery County has given new enthusiasm for the Missouri soil testing program. It shows again that although soil tests are not perfect, they are remarkably reliable guides to the soil treatments needed on a given field. It has also emphasized the fact that just because fertilizer recommendations based upon soil tests are made, they are not necessarily followed.

In a period of rising costs and lower farm prices, the importance of producing each unit at the lowest cost possible is extremely important. Stopping at the halfway point on fertilizer use narrows the margin of profit.

The Value of Lime . . .

(*From page* 26)

of cotton, 1,832 pounds of seed cotton per acre, was produced on the limed plots which had been fertilized with 600 pounds of 8-8-8. The plots receiving 8-8-8 without lime produced 361 pounds less seed cotton per acre than similarly fertilized plots that were limed. These results definitely show that liming should be considered as part of the soil fertility program on soils as acid as pH 5.4 when acidic fertilizers are to be used.

Data in Table II on the effects of lime and fertilizers on pH, organic matter, and available potassium, calcium, and magnesium in the soil show certain definite results. Although the base exchange capacity of the soil is low, 8 m.e., liming with 3,000 pounds per acre of dolomitic limestone has maintained a desirable reaction, pH 6.4, after a period of eight years. Increases in the soil organic matter were generally associated with increases in yield; however, the increases in the organic matter on the plots that were not limed were somewhat greater than on the

limed plots. Liming depressed the available potassium. Liming increased the available calcium relatively about the same as the available magnesium. The available phosphorus in the soil as determined by dilute hydrochloric acid extraction was so low, about 10 ppm., in all plots that no significant changes were measured. The yield data and growth symptoms in the young plants both indicated that liming increased the availability of phosphorus.

TABLE II.—THE EFFECT OF DOLOMITIC LIMESTONE AND FERTILIZERS ON THE pH, ORGANIC MATTER, AND AVAILABLE POTASSIUM, CALCIUM, AND MAGNESIUM ON OLIVIER SILT LOAM, SAMPLED AT THE END OF GROWING SEASON, 1954

Fertilizer treatment 600 lbs/A.	Limed [1]					Not limed				
	pH	O.M. %	K ppm.	Ca ppm.	Mg ppm.	pH	O.M. %	K ppm.	Ca ppm.	Mg ppm.
0–0–0	6.6	1.07	73	590	220	5.2	1.00	81	360	170
8–0–0	6.5	1.14	55	600	210	5.3	1.18	77	400	140
0–8–8 [2]	6.5	1.21	149	660	200	5.3	1.29	163	450	140
4–8–8 [2]	6.4	1.20	113	660	200	5.1	1.28	133	425	125
8–0–8 [2]	6.4	1.20	117	590	215	5.1	1.21	118	360	145
8–4–8 [2]	6.4	1.27	98	590	200	5.2	1.29	120	360	150
8–8–0 [2]	6.4	1.26	64	660	205	5.3	1.21	75	440	140
8–8–4 [2]	6.4	1.30	132	660	205	5.4	1.32	107	450	125
8–8–8 [2]	6.4	1.16	122	625	195	5.3	1.25	150	425	115
L.S.D. (0.05)	.....	0.15	38	170	22	.....	0.15	38	170	22

[1] Limed in 1946 with 3,000 pounds per acre of dolomitic limestone.
[2] Corn plots sidedressed with an additional 48 pounds N as NH_4NO_3.

Uncle Sam's Ire

(*From page* 5)

too. There is a law that prohibits issuance or publication of federal reports that estimate in advance the probable price of cotton. Firms which furnish private figures from their books respecting the cotton situation are protected fully by another law making it a misdemeanor to disclose such data without the permission of the Secretary.

Stiff penalties are also provided for unauthorized distribution of facts and figures secured from parties to a marketing agreement or order, as well as for information about trade secrets, processes, and confidential matters taken from records of business concerns used by federal investigators and examiners. Disclosure of the names of borrowers of farm credit institutions is penalized too, except when it is directed by a commissioner or a bank board or by congress or courts of jurisdiction.

"Covering up" is penalized. Whoever willfully and knowingly conceals or falsifies material facts or keeps deceptive accounts or fictitious entries for the government departments is liable to a fine of at least $10,000 with or without five years behind bars.

If you are a government official or employee it is illegal for any person, association, or corporation to make contributions to supplement your salary as a federal worker, except sums that come from the treasury of a state or any of its political subdivisions. This means that in general your only receipts for services thus performed must come solely from the government, without any bountiful outsider kicking in.

It is perfectly legal for any officer

or employee of the Department to transmit, when so requested, to a member of congress any data to back up requests for legislation or appropriations that will promote progress and efficiency. But it is a fineable and often a dismissable offense for any employee to try to influence the vote of any legislator directly or indirectly through any channel of communication. Public hearings are, of course, a different matter.

WE next reach a piece of punitive legislation by congress that was passed to catch big offenders with large sums of perquisites in mind, but which makes a multitude of ordinary small employees into law-breakers or law-defiers in the normal course of social relations. During my own period of 10 years with the USDA, I probably broke this particular statute into flinders several times a year. This is what it specifies:

"No officer or employee in the U. S. Government service shall solicit contributions from other officers, clerks, and employees for a gift to those in a superior official position, nor shall such officials or supervisors take any present offered from those in the employment of the government receiving less pay than themselves; nor shall any clerk or officer make any such gift or present to any official superior. Violation means discharge from the service."

Observance of birthdays and going-away parties have been common social practices in federal service, both for superiors and "inferiors." Presentation of little gifts at such times is usually the custom. Then just on the eve of retirement, gift subscriptions are freely circulated for the retiree. For instance, about three dozen or more men and women gave yours truly a typewriter on his last day of service. Obviously, the discharge penalty for me meant nothing, but how about a few signatures on the list I treasure representing clerks who got lower grade salaries than I did? In harmless cases of this

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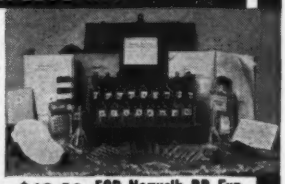

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kind, there is little reason to inflict an oversized penalty. It is recognized herein that too much of this gift-pooling can be a nuisance, even at a dime or a quarter apiece. But let each department make its own rules.

AS far as I know, nothing has been legislated regarding the daily "coffee breaks." Congress at times has done some sleuthing to investigate the waste of time involved, but at least half of the time you'll find the coffee-hounds discussing some internal departmental business, a sort of extension of their own office conferences.

Federal laws are after the blackmailer also. Suppose you have knowingly or otherwise violated some law or regulation of the nation. Suppose a sharper happens to learn of it and approaches you and offers to keep mum about it for a certain compensation. Right there he is risking his neck, financially, as this shady transaction is subject to a fine of $2,000 and a year in the hoosegow, or both.

Fines, prison terms, and possible forfeiture of a federal job follow upon conviction of forms of bribery in such cases as these: Adjustment or cancellation of farm loans; taking of money or gifts by meat and livestock inspectors offered by persons or firms engaged in interstate commerce; acceptance of any special fee or other consideration in connection with loans and securities of a national farm loan association, federal land-bank, or intermediate credit bank; acceptance of a gratuity by a farm credit examiner from any organization he examines; and the asking and acceptance of money or things of value to influence the performance of public services.

Severe penalties are invoked through the corresponding sections that relate to violations by citizens not employed by the government. Among the noteworthy criminal acts included are: Trying to influence official inspectors under the Cotton Standards Act and the Grain Standards Act; gifts or offers to give valuables to employees of the Department who examine meat and meat products, with intent to influence his decision; or bribery of a hearing officer or trial witness in proceedings authorized by law.

Theft or improper conversion of property owned, mortgaged, or stored and pledged to the Commodity Credit Corporation is a felony. The surrender of a basic farm commodity that is stored or about to be stored under the U. S. Warehouse Act without getting the warehouse receipts rates a fine of $10,000 or more and ten "long years" in the pen.

Under the Commodity Credit Corporation operations it is a felony for anyone to willfully make false statements or make over-valuations of any security intended to influence the Corporation's action. In a like manner, the same provisions hold true for attempts to falsify the accounts administered by the federal farm credit agencies and facilities, or to render untrue statements in connection with the adjustment or cancellation of any farm indebtedness.

IT is a misdemeanor to refuse to furnish information when requested concerning giving of false information by warehousemen and others relating to the grades and staple lengths of stored cotton, the amount of leaf tobacco on hand, and all similar operations with such commodities as peanuts, sugar, tobacco, corn, wheat, cotton, and rice for farm marketing quota purposes. Failure of livestock packers, poultry processors, and dealers and market agencies to keep prescribed business records is felonious, as well as is the refusal by cotton traders to answer questions or show papers covering operations in bona fide spot markets.

Use of the names or combinations of names by private firms to look like

the names of federal banking agencies or agricultural or other credit agencies is flatly prohibited.

Even the 4-H clubs are protected from unauthorized display or use of the official sign or emblem by those who wish to make folks believe he or she is a member of or an agent of the nation-wide youth organization. If other than the persons or groups authorized by the 4-H club office use such symbol or insignia with the words "4-H club" in colored imitation of the real thing, they get a fine of $250 or six months in jail. In cases where someone deliberately poses as a representative of the 4-H club institution, he faces a fine of $300 and six months in the "stir."

EVERYBODY that ever traveled into the U. S. forest preserves knows about the safeguards and warnings posted to deter the careless from causing fires or to punish the willful despoilers for cutting down timber, trespassing, burning, or unlawful livestock grazing. But perhaps fewer folks know that the fire-prevention bear, widely known as "Smokey Bear," is likewise protected from unwarranted plagiarism. However, if you desire to follow the official pattern and make wise use of Smokey, a special permit can be had through the Forest Service and with the approval of the Secretary of Agriculture. Reproduction or use of this doughty character with his ranger attire and ready shovel when not fully authorized is up against a $250 fine.

Huge and dominating though the government business has become, one can happily believe that cases of willful and deliberate violations of good conduct are mighty small in proportion. The rank and file of our civil servants remain comfortably unaware of these complex fines and prison penalties. The genuine satisfaction most of them get from rendering high caliber service within their abilities is usually plenty of additional reward.

For Reliable Soil Testing Apparatus there is no substitute for LaMOTTE

LaMotte Soil Testing Service is the direct result of 30 years of extensive cooperative research. As a result, all LaMotte methods are approved procedures, field tested and checked for accuracy in actual plant studies. These methods are flexible and are capable of application to all types of soil, with proper interpretation to compensate for any special local soil conditions.

Time-Proven LaMotte Soil Testing Apparatus is available in single units or in combination sets for the following tests:

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Nitrite Nitrogen	
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Available Phosphorus	Magnesium
Chlorides	Aluminum
Sulfates	Replaceable Calcium

Tests for Organic Matter and Nutrient Solutions (hydroculture) furnished only as separate units.

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Standard model for pH, Nitrate, Phosphorus and Potash. Complete with instructions.

Illustrated literature will be sent upon request without obligation.

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FREE LOAN OF EDUCATIONAL FILMS

The American Potash Institute will be pleased to loan to educational organizations, agricultural advisory groups, responsible farm associations, and members of the fertilizer trade the motion pictures listed below. This service is free except for shipping charges.

FILMS (ALL 16 MM. AND IN COLOR)

The Plant Speaks Thru Deficiency Symptoms (Sound, running time 25 min. on 800-ft. reel.)

The Plant Speaks, Soil Tests Tell Us Why (Sound, running time 10 min. on 400-ft. reel.)

The plant Speaks Thru Tissue Tests (Sound, running time 14 min. on 400-ft. reel.)

The plant Speaks Thru Leaf Analysis (Sound, running time 18 min. on 800-ft. reel.)

Save That Soil (Sound, running time 28 min. on 1200-ft. reel.)

Borax From Desert to Farm (Sound, running time 25 min. on 1200-ft. reel.)

Potash Production in America (Sound, running time 25 min. on 800-ft. reel.)

In the Clover (Sound, running time 25 min. on 800-ft. reel.)

In Canada: The Plant Speaks Thru Deficiency Symptoms
The Plant Speaks, Soil Tests Tell Us Why
The Plant Speaks Thru Tissue Tests
The Plant Speaks Thru Leaf Analysis
Borax From Desert to Farm
Potash Production in America

DISTRIBUTORS

Northeast: Educational Film Library, Syracuse University, Syracuse 10, N. Y.

Southeast: Vocational Film Library, Department of Agricultural Education North Carolina State College, Raleigh, North Carolina.

Lower Mississippi Valley and Southwest: Bureau of Film Service, Department of Educational Extension, Oklahoma A & M College, Stillwater, Oklahoma.

Midwest: Visual Aid Service, University Extension, University of Illinois, Champaign, Illinois.

West: Department of Visual Education, University of California, Berkeley 4, California.

Department of Visual Education, University of California Extension, 405 Hilgard Ave., Los Angeles 24, California.

Department of Visual Instruction, Oregon State College, Corvallis, Oregon.

Bureau of Visual Teaching, State College of Washington, Pullman, Washington.

Canada: National Film Board, Ottawa, Ontario.

For the Province of Ontario: Distribution Services, Ontario Agricultural College, Guelph, Ontario.

IMPORTANT

Requests should be made well in advance and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of loan.

Request bookings from your nearest distributor.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Reprints

3-1-56 Potash in Agriculture
28-12-45 Better Corn (Midwest) (Circular)
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What is the Matter with Your Soil?
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
A-1-44 What's in That Fertilizer Bag?
P-3-45 Balanced Fertility in the Orchard
Z-5-45 Alfalfa—The Aristocrat
ZZ-11-45 First Things First in Soil Fertility
T-4-46 Potash Losses on the Dairy Farm
Y-5-46 Learn Hunger Signs of Crops
TT-11-47 How Different Plant Nutrients Influence Plant Growth
AA-6-48 The Chemical Composition of Agricultural Potash Salts
GG-10-48 Starved Plants Show Their Hunger
SS-12-49 Fertilizing Vegetable Crops
BB-8-50 Trends in Soil Management of Peach Orchards
X-8-51 Orchard Fertilization Ground and Foliage
BB-10-51 Healthy Plants Must Be Well Nourished
II-12-51 Pasture Improvement With 10-10-10 Fertilizer
KK-12-51 Potassium in Animal Nutrition
A-1-52 Research Points the Way to Higher Levels of Peanut Production
Y-10-52 The Nutrition of Muck Crops
CC-12-52 The Leaf Analysis Approach to Crop Nutrition
I-2-53 Sericea Is a Good Drought Crop
J-3-53 Balanced Nutrition Improves Winter Wheat Root Survival
K-3-53 Kudzu Keeps Growing During Droughts
N-4-53 Coastal Bermuda—A Triple-threat Grass on the Cattleman's Team
P-4-53 Learning How to Make Profits from Sweet Potatoes
T-5-53 Trefoil Is Different
W-6-53 The Development of the American Potash Industry
DD-10-53 Sampling Soils for Chemical Tests
II-11-53 The Importance of Legumes in Dairy Pastures
JJ-11-53 Boron—Important to Crops
MM-12-53 White Birch Helps Restore Potash-Deficient Forest Soils
K-2-54 Soil and Plant Analysis Increase Fertilizer Efficiency
R-3-54 Soil Fertility (Basis for High Crop Production)
U-4-54 Nutrient Balance Affects Corn Yield and Stalk Strength
CC-6-54 Fertility Increases Efficiency of Soil Moisture
EE-8-54 Red Apples Require Balanced Nutrition
FF-8-54 Apply Fertilizers in Fall For Old Alfalfa, Grass Pasture and Timothy-Brome Fields
GG-8-54 Effect of Boron on Beets and Crops Which Follow
JJ-10-54 Principles Involved in Soil Testing
LL-10-54 Relation of Fertilizer to Quality and Yield of Flue-cured Tobacco
MM-10-54 Longer Life for Ladino
SS-11-54 Foliar Application of Plant Nutrients to Vegetable Crops
VV-12-54 Potassium Affects Growth of Stocks
YY-12-54 Physical Condition of the Soil Affects Fertilizer Utilization
A-1-55 Potash-Deficiency Symptoms
C-1-55 Summary of Ten Years' Work with Complete Fertilizers on Sugar Cane
D-1-55 Nitrogen Use Accentuates Need for Minerals
G-2-55 Seven Steps to Good Cotton
H-2-55 Apparent Fertility Trends in Western Irrigated Soils
I-2-55 Shortages of Potash Limit Grape Yields
L-3-55 Soybean Production in the Southern States
P-3-55 N-P-K for Deciduous Fruit Trees
S-4-55 Greener Pastures Mean Better Living
U-4-55 Fertilizer Recommendations—Burley Tobacco
V-4-55 Planned Nutrition for Canning Tomatoes
W-5-55 The Production of Sugar Beets on Organic Soils
X-5-55 What Is Happening to Our Citrus Soils?
Y-5-55 Pasture Improvement Through Renovation
Z-5-55 Azalea Fertilization
BB-8-55 Residual Fertility Insures Alfalfa After Drouth
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A-1-56 Why More Alfalfa?
B-1-56 Certain Practices Are Important for Successful Pecan Production
C-1-56 A Successful Corn Crop on the Same Land Every Year Is a Possibility
D-2-56 Give Fertilizers A Chance
E-2-56 Fertilizer Statistics From the 1954 Census of Agriculture
F-2-56 Fertility-lime Status of Mississippi Soils
G-2-56 Plant-food Content of Crops—Guide to Rotation Fertilization
H-3-56 The Application of Fertilizers in Irrigation Waters

THE AMERICAN POTASH INSTITUTE

1102 16th STREET, N. W. WASHINGTON 6, D. C.

A hillbilly grandfather was laboriously writing a letter.

"Lucifer," he said, "how do you spell 'rat'?"

"That easy, grandpaw, R-A-T."

"Naw, I don't mean mousey rat. I mean rat now!"

* * *

Since little Johnnie's personal horizon had been greatly extended by several months at kindergarten, his mother decided to inquire concerning his current loyalties.

"Dear," said she, "whom do you love the best?"

The youngster pondered the query soberly and then replied, "Well, I love you best, Mommie, and Daddy next best, and my teacher the least. And in between come a lot of dogs."

* * *

Parker had been celebrating and was making his way home—walking with one foot on the pavement and the other in the gutter. A policeman approached him and said sternly, "You're drunk."

"Oh, thank goodness!" said Parker. "You know, I thought I was a cripple."

* * *

"Hey, you," yelled the cop at the amorous driver, "why don't you use both hands?"

"I'm afraid to let go of the steering wheel."

* * *

"My father always proposed a toast before he disciplined me."

"That's funny. What was it?"

"Bottoms up."

During a congressional campaign the Republican and Democratic candidates met at the same time in a town with only one large auditorium.

The sheriff, who had to sweep out the courthouse, told the candidates they'd have to have their meetings at the same time because he didn't intend to sweep twice in one day.

And it was up to this sheriff to introduce the opposing candidates. He arose and said, "I want to present to you a man who, above anyone, has the welfare of each and every one of you at heart. More than anyone I know, he is devoted to our great and glorious state. He understands, as no other man, the problems of our great nation. I know of no other who is so expert in foreign affairs, education, economics, taxation. . . ."

Then the sheriff turned to the candidates and asked: "Which of you polecats wants to talk first?"

* * *

Girl's father: "Young man we turn the lights out here at 10 p.m."

Boy caller: "That'll be o.k. We will not be reading."

* * *

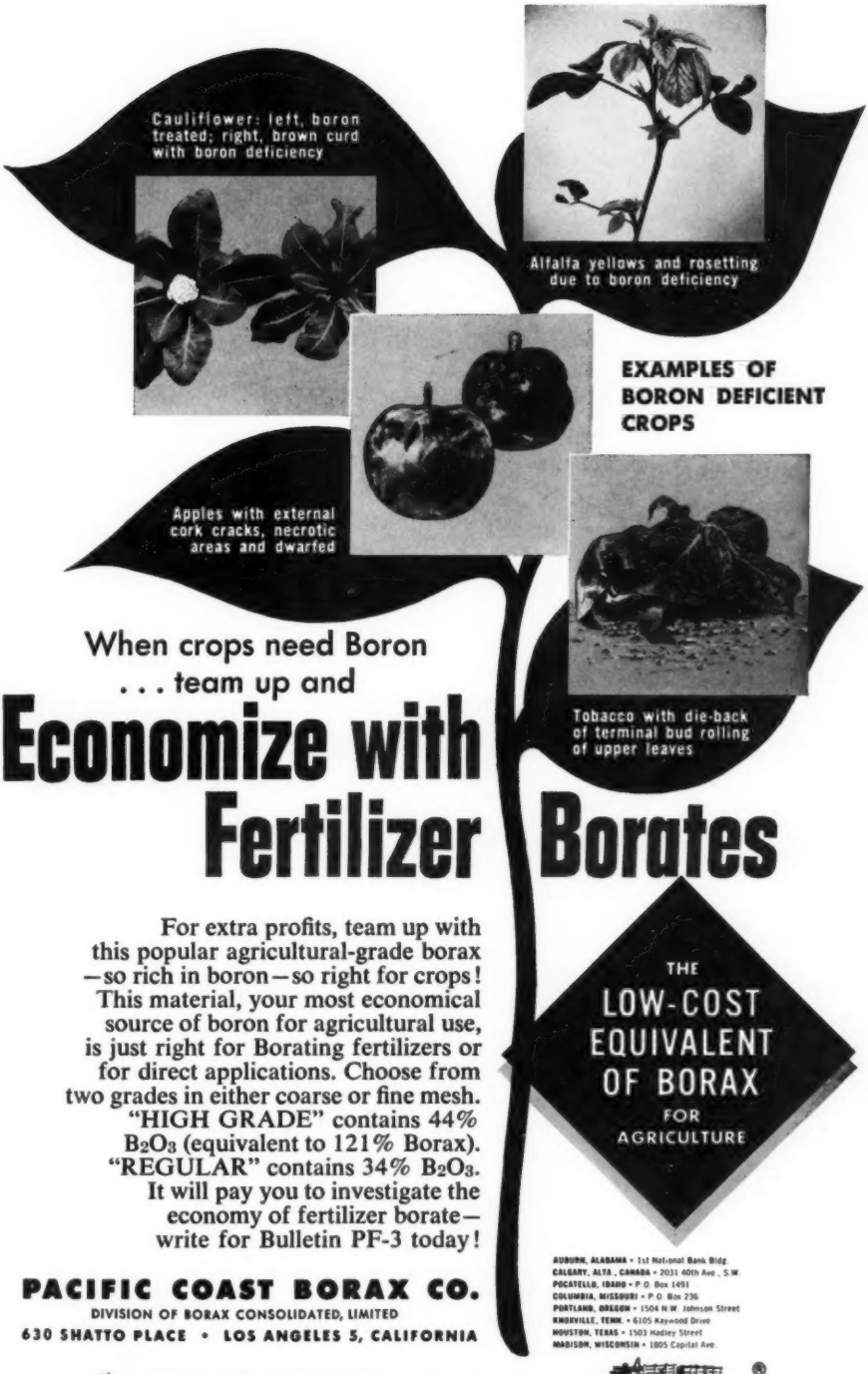
Joe (greeting friend he hadn't seen for some time): "Well, Jim who are you working for now?"

Jim: "Same people—the wife and three kids."

* * *

Sal—"Cantcha ever say anything romantic, Slim."

Slim—"Shore, gal. You're more like a rose than anything I ever smelt."


Cauliflower: left, boron treated; right, brown curd with boron deficiency
Alfalfa yellows and rosetting due to boron deficiency
EXAMPLES OF BORON DEFICIENT CROPS
Apples with external cork cracks, necrotic areas and dwarfed
Tobacco with die-back of terminal bud rolling of upper leaves

When crops need Boron
. . . team up and

Economize with Fertilizer Borates

For extra profits, team up with this popular agricultural-grade borax—so rich in boron—so right for crops! This material, your most economical source of boron for agricultural use, is just right for Borating fertilizers or for direct applications. Choose from two grades in either coarse or fine mesh. "HIGH GRADE" contains 44% B_2O_3 (equivalent to 121% Borax). "REGULAR" contains 34% B_2O_3. It will pay you to investigate the economy of fertilizer borate—write for Bulletin PF-3 today!

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